Journal of Theoretical Educational Science, 15(3), 561-604, July 2022
Kuramsal Eğitimbilim Dergisi, 15(3), 561-604, Temmuz 2022
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1062721

Critical Thinking Skills and Dispositions of Turkish Pre-service Teachers: A Systematic Review of Research*

Türk Öğretmen Adaylarının Eleştirel Düşünme Becerileri ve Eğilimleri: Alandaki Araştırmaların Sistematik Analizi

Ozlem YILDIRIM-TASTI** **Ali YILDIRIM*****

Received: 25 January 2022 **Research Article** **Accepted:** 24 March 2022

ABSTRACT: This paper aims to analyze the research literature on Turkish pre-service teachers' critical thinking skills (CTS) and critical thinking dispositions (CTD) to identify the major knowledge claims and areas of further research. This systematic review study examined both quantitative and qualitative studies conducted between years 2010-2020, in Turkey. The educational research regarding Turkish pre-service teachers' CTS and CTD was investigated in electronic national and international databases including ERIC and TR Dizin. Considering our inclusion criteria, we included 88 studies in our review. Firstly, we completed descriptive analysis of the selected studies. Then, we analyzed their content. The descriptive analysis showed that quantitative research designs dominate the field. These studies report low-level of CTS of the participants. On the other hand, we presented our thematic analysis under two main themes: traditional perspectives and critical perspectives. We conclude that a few studies adopt a critical stand in the realm of traditional approaches. We argue that such a perspective downgrades CT into a set of generic skills and neglects contextual and individual differences. It further diverges pre-service teachers from their roles as critical educators who actively participate in transformation of their society.

Keywords: Critical teachers, critical thinking, pre-service teachers, systematic review, Turkey.

ÖZ: Bu makalenin amacı, Türk öğretmen adaylarının eleştirel düşünme becerileri (EDB) ve eleştirel düşünme eğilimleri (EDE) ile ilgili araştırmaları analiz etmek ve bu araştırmaların temel bulgularını ve sonuçlarını ortaya koymaktır. Bu kapsamda, Türkiye'de 2010-2020 yılları arasında yapılan ve ERIC ve TR Dizin dâhil olmak üzere ulusal ve uluslararası veri tabanlarında yayınlanan nicel ve nitel araştırmalar incelenmiştir. Belirlenen ölçütler çerçevesinde 88 araştırma çalışmaya dâhil edilmiştir. İlk olarak, incelenen çalışmaların betimsel analizi tamamlanmış, daha sonra çalışmaların içerik analizi yapılmıştır. Betimsel analiz, nicel araştırma yaklaşımının alanda daha baskın olduğunu göstermiştir. Ayrıca bu çalışmalar, katılımcıların düşük düzeyde eleştirel düşünme (ED) becerilerine sahip olduğunu göstermiştir. Öte yandan tematik analiz iki ana başlık altında sunulmuştur: geleneksel yaklaşım ve eleştirel yaklaşım. Sonuçlar, geleneksel bakış açılarının araştırmaların çoğunda temel yaklaşım olarak yer aldığını, sadece birkaç araştırmada eleştirel yaklaşımın kavramsal çerçeveyi oluşturduğunu göstermiştir. Böyle bir anlayışın, ED'yi bir dizi genel becerilere indirgediğini ve bağlamsal ve bireysel farklılıkları göz ardı ettiğini söylemek mümkündür. Ayrıca bu anlayışın, öğretmen adaylarının toplumlarının dönüşümüne aktif olarak katılan eleştirel eğitimci rollerinin önünde bir engel olabileceği düşünülmüştür.

Anahtar kelimeler: Eleştirel düşünme, eleştirel öğretmenler, öğretmen adayları, sistematik analiz, Türkiye.

* This study was presented as an "oral presentation" at the European Conference on Educational Research held in Geneva (online) between 6-10 September 2021.

** *Corresponding Author*: Dr., Aksaray University, Aksaray, Turkey, ofytasti@aksaray.edu.tr, https://orcid.org/0000-0002-7073-5315
*** Prof. Dr., University of Gothenburg, Göteborg, Sweden, ali.yildirim@gu.se, https://orcid.org/0000-0001-7350-0741

Citation Information
Yildirim-Tasti, O., & Yildirim, A. (2022). Critical thinking skills and dispositions of Turkish pre-service teachers: A systematic review of research. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 15*(3), 561-604.

ISSN: 1308-1659

Rapid developments and changes in technology and science have brought about a new era: the information age in which the main aim of societies is to keep pace with these changes. This era demands creative and reflective citizens who think, ask questions, do research, seek the truth, and find rational solutions to the problems of the societies (Ennis, 1991; Halpern, 1999). In this regard, the pivotal role of education has been emphasized as training active citizens who are equipped with lifelong learning skills (Keser et al., 2011; Paul & Binker, 1990). Among those skills, critical thinking (CT), as a catalyzer for a democratic society, has of primary importance (Halpern, 1999).

CT is mainly defined as "purposeful, reasoned, and goal-directed. It is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions." and includes reflecting on the thinking process (Halpern, 1998, p. 70). It is also "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as an explanation of the evidential, conceptual, methodological, criteriological, or conceptual considerations upon which that judgment is based" (Facione, 1990, p. 3). The term CT further embodies reasonable and reflective thinking (Ennis, 2011); analysis of arguments (Bowell & Kemp, 2005; Dellantonio & Pastore, 2021; Ennis, 1985; Paul, 1992, 2011), reasoning and evaluating (Ennis, 1985; Facione, 1990; Halpern, 1997), and making reasonable decisions (Ennis, 1985; Halpern, 1998; Willingham, 2008). What is more is that CT is a process initiated, analyzed, evaluated, reflected, and reconstructed by the individual (Paul & Elder, 2006) to improve the quality of his/her thinking (Scriven & Paul, 1987). Embedded in these definitions, critical thinkers are assumed to use certain skills appropriately and consciously in different contexts (Bailin & Siegel, 2003; Halpern, 1998; Paul & Elder, 2006).

Beyond its definition, CT requires the recognition of when to use critical thinking skills (CTS) and the willingness to employ those skills that refer to critical thinking dispositions (CTD) (Facione, 1990; Harrell & Wetzel, 2015). CTS and CTD are, indeed, different concepts. A critical thinker, who has the ability and is aware of when to use it, might not be willing to engage in such a process which refers to CTD (Halpern, 1998). In other words, different from CTS, CTD is "consistent internal motivations to act toward or respond to persons, events, or circumstances in habitual, yet potentially malleable ways" (Facione, 2000, p. 64). There are seven dimensions of CTD as explicated by Facione et al. (1995): open-mindedness, inquisitiveness, systematicity, analyticity, truth-seeking, self-confidence, and maturity (pp. 6-9).

Given the definitions of CT, it can be interpreted that despite some core elements, there is disagreement regarding the definition of CT due to its complexity and the origins it is rooted in. The above definitions of CT are mainly derived from the fields of philosophy and psychology (Lewis & Smith, 1993). In the field of education, on the other hand, CT traces back to Dewey's works (Ennis, 1991). To date, many scholars have contributed to the field (e.g., Ennis, 2013; Sternberg, 1987). Specifically, scholars have employed various educational interventions to improve CTS and CTD of students and teachers (e.g., Dumitru et al., 2018; Harrell & Wetzel, 2015; Heard et al., 2020; Toulmin, 2003). The prevailing finding of those studies is that when guided by teachers who had training to teach CT, educational interventions are more effective (Abrami et al., 2008). Nevertheless, Sternberg (1987) contends that teacher expectations

and perceptions stand as a barrier to the teaching of CTS. The author also argues that the reasons for the teacher fallacies are threefold. First, teachers underestimate or ignore the idea that teachers can learn from students, as well. Second, teachers mainly manage the process as an instructor rather than a facilitator. Third, they do not accept that there is not a one-size-fits-all approach to teaching CTS; on the contrary, it is a highly context-depended process. These teacher fallacies shift our attention from teachers to teacher education. Put differently, teacher education plays an important role in equipping teacher candidates with skills and knowledge to teach CT (Paul et al., 1997). Nonetheless, in the teaching of CT, higher education institutions mostly adopt an approach that detaches the subject from the context that thinking occurs while underestimating the complex and contingent nature of learning (Danvers, 2018). Therefore, including CT in teacher education programs is not sufficient. Educating future teachers as critical educators who are aware of the power of education as a transformative means (Giroux, 1988) is essential. This requires an alternative interpretation of CT grounded on the tenets of critical pedagogy (Burbules & Berk, 1999).

Status of CT in the Turkish Educational Context

Entrenched with the global developments and changes, the importance of CT is emphasized through two general statements under the purposes of the Turkish National Education:

1. as individuals … who are developed in terms of body, mind, morale, spirit, and emotions, free and with scientific thinking abilities and a wide worldview, … who are responsible toward society, who are constructive, creative and productive
2. in line with their interests and abilities, … to acquire the required knowledge, skills, behavior, and cooperative working habits… (Ministry of National Education, 1973)

In order to accomplish these goals, the formal curricula in Turkey have undergone a major change in 2004. The constructivist approach was adopted in determining the aims and objectives of the curricula at all school levels. Accordingly, teacher education programs were first revised in 2006. It was reported that teacher education programs should meet the requirements that facilitate effective implementation of the formal curricula. Specifically, it was stated that they should help student teachers to develop thinking skills. Most recently, another revision has been done in 2018, including but not limited to, adding "Critical and Analytic Thinking" as an elective course within the scope of professional teaching knowledge. Nevertheless, critical thinking is explicitly emphasized only in Foreign Language Teaching Programs and Gifted Education Teacher Program. This implies that critical thinking is still perceived as a higher-order thinking skill or part of language teaching rather than a competence that each student teacher should possess.

Succinctly, the CT literature has drawn much interest among scholars who see it as significant to the development of their society, though in different forms. A mounting body of literature in Turkey has also included CT as the inquiry unit in which student teachers participated. Nevertheless, most of them employ a quantitative approach to examine CTS and CTD of the participants and generally report low-level CTD (Cansoy

et al., 2018). Therefore, we argue that it is essential to provide a depiction of the existing research, both quantitative and qualitative, to move beyond the CT scores of the participants. In this regard, review studies that evaluate teacher education research conducted in Turkey and relate the emerging knowledge with the international literature have a pivotal role in providing breadth and depth of knowledge in the existing research while offering implications for further research and practice (Yildirim, 2013). Accordingly, this review study aims to bring the studies conducted about CTS and CTD of Turkish teacher candidates together within the last decade from a critical perspective. As the review intends to uncover common and diverging aspects across studies, it might help educators reach more solid conclusions that have implications for educational policy and practice. Also, this study differs from other review studies (e.g., Cansoy et al., 2018) in its methodology and conceptual framework. The following research questions guided our study:

1. What critical thinking areas do the studies in teacher education focus on?
2. What methodological traditions do the studies on critical thinking represent?
3. What are the knowledge claims studies on critical thinking offer for practice and further research?

Conceptual Framework

Two strands in the literature are relevant to this study: "critical thinking movement" and "critical pedagogy". Despite their commonalities, they have distinct aspirations in using the word critical. The former, rooted in the philosophical and psychological orientations, holds a more traditionalist perspective of CT. This perspective is advocated by scholars such as Ennis (1991, 2011, 2015), Halpern (1999), and Halpern and Butler (2019), who argue that CT consists of a set of skills that lead to reasonable decision-making. The word critical, as used by those scholars, refers to "to be more discerning in recognizing faulty arguments, hasty generalizations, assertions lacking evidence, truth claims based on unreliable authority, ambiguous or obscure concepts, and so forth" (Burbules & Berk, 1999, p. 46). Taking this meaning one step further, scholars in this tradition (e.g., Elder & Paul, 2021; Facione, 1990, 2020; Paul, 1981, 2018) add the dispositions aspect to CT, which refers to one's willingness to think critically. Nevertheless, it is argued that both skills-only and skills-dispositions perspectives discern CT as a higher-order cognitive skill (ten Dam & Volman, 2004).

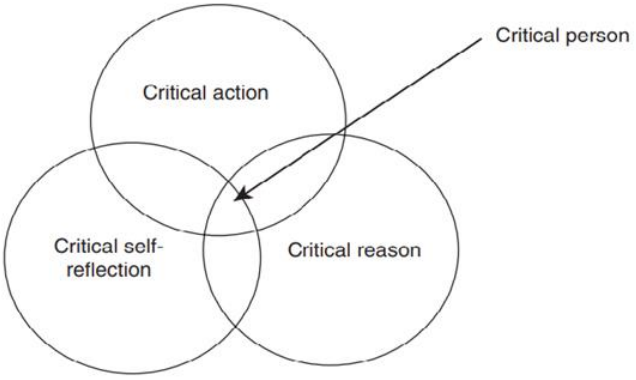
Contrary to the prescriptive perspective in teaching of CT, the critical pedagogy tradition brings a different perspective, and questions the sovereign powers and the belief systems the term "critical" highlights" (Davies, 2015; Davies & Barnett, 2015). The proponents of this perspective argue that other forms of evidence or verification, such as experience and emotions, can also affect one's reasoning (Burbules & Berk, 1999). Furthermore, they assert that the traditional perspective is culturally biased (Sibbett, 2016) and relies on men's ways of knowing in explaining rational thinking (Severiens & ten Dam, 1998). In this context, Paulo Freire and his followers, including distinguished scholars such as Giroux and Apple, assert that Critical Pedagogy aims to create a deliberate consciousness among the public to eliminate any form of marginalization and inequality in societies by emancipating citizens from the chains of the dominant ideology and helping them to transform their societies (e.g., Freire, 2018; Giroux, 1988; Kaplan, 1991). Put differently, beyond positivist perspectives that

downgrade CT into i) a set of skills to improve thinking, ii) problem-solving without asking questions about the problem itself (etc. Whose problem is this?), iii) a process that should be exercised only by the student, iv) and an abstract mode of thinking independent of lives of students and teachers, CT requires informed and committed action (Fernandez-Balboa, 1993). CT, in this perspective, can only be achieved by emancipated teachers whose roles and functions are not defined and determined by the dominant, and are not perceived as technicians who implement, without any conceptualization, the script curricula to transmit knowledge (Giroux, 1985).

Despite the differences explained above, as a common core, both critical thinking, and critical pedagogy perspectives, as Figure 1 displays, involve action, self-reflection and reasoning that define the critical person. They emphasize that the critical person reasons and reflects on his/her reasoning, and then, take the necessary action. The action dimension, though, indicates different intentions. From a traditional perspective of CT, action refers to one's reflecting on her/his reasoning (Davies & Barnett, 2015). According to Critical Pedagogues, on the other hand, action stands for active participation in the transformation of societies toward a democratic society (Sibbett, 2016).

Figure 1

The Intersection between Critical Reason, Critical Self-Reflection, and Critical Action



Note. (Barnett, 1997, p. 105).

Whether defined as skill-only or skill-dispositions, educational interventions are found to be effective in teaching how to think critically (Harrell, 2011; Hitchcock, 2015; Jones, 2015; Moore, 2013). Ennis made important contributions in the field of education by introducing four instructional approaches to teach CTS: general, infusion, immersion, and mixed (1989). The general approach indicates direct and explicit instruction in which CTS is emphasized outside the context of a specific subject matter. The infusion approach entails in-depth instruction in the subject matter plus explicit instruction on general CT principles. In the third approach, the immersion approach, CTS is included in the content of the subject matter; however, there is no explicit instruction as in the general approach; that is, students are expected to gain those skills naturally through the instructional process. The last approach brings together the aspects of others with an eclectic perspective.

As the other prolific design, Halpern's four-part model includes "(a) a dispositional or attitudinal component, (b) instruction in and practice with critical-thinking skills, (c) structure-training activities designed to facilitate transfer across contexts, and (d) a metacognitive component used to direct and assess thinking" (1998, p. 451). She enunciates that better thinking can be taught through the means of instruction that allows the transfer of learning to out-of-the-classroom contexts.

Following the critical genre of literature, in this paper, we mainly share the views of critical pedagogues. We accept that teaching to think critically requires the development of certain skills and dispositions and reflecting upon them. Nevertheless, while doing so, we argue that contested issues and multiple perspectives that provide explanations to those issues should be presented. Learners should be provided with opportunities in which they practice critical participation in society. This will enable learners to question the hegemonic powers in society and encourage them to actively participate in opposing injustices in society.

We argue that teachers have a critical role in accomplishing such a goal. They should act as transformative intellectuals who:

> develop counterhegemonic pedagogies that not only empower students by giving them the knowledge and social skills they will need to be able to function in the larger society as critical agents, but also educate them for transformative action. That means educating them to take risks, to struggle for institutional change, and . . . empowering students so they can read the world critically and change it when necessary (Giroux, 1988, p. xxxiii, xxxiv)

It is the key to achieving democratic and just societies since pedagogy is a moral and political practice that mirrors the power relations in society while reproducing certain knowledge as the official one (Apple, 1993; Giroux, 2010). Therefore, as agents of change, teachers should be empowered to resist any kind of oppression that depresses teacher autonomy. Of course, it is not an easy task. Most teacher education programs do not allow for such practices (Kirk, 1986) as "in these programs, teaching is not viewed as a democratizing or counter-hegemonic activity" (Fernandez-Balboa, 1993, p. 68). Therefore, training future teachers as transformative intellectuals who i) are willing to take part in the transformation of their societies and schools, ii) reflect on their pedagogical practice, and iii) encourage students to critically reflect on their learning and experiences (Aronowitz & Giroux, 2003) should be a priority of teacher education programs.

Method

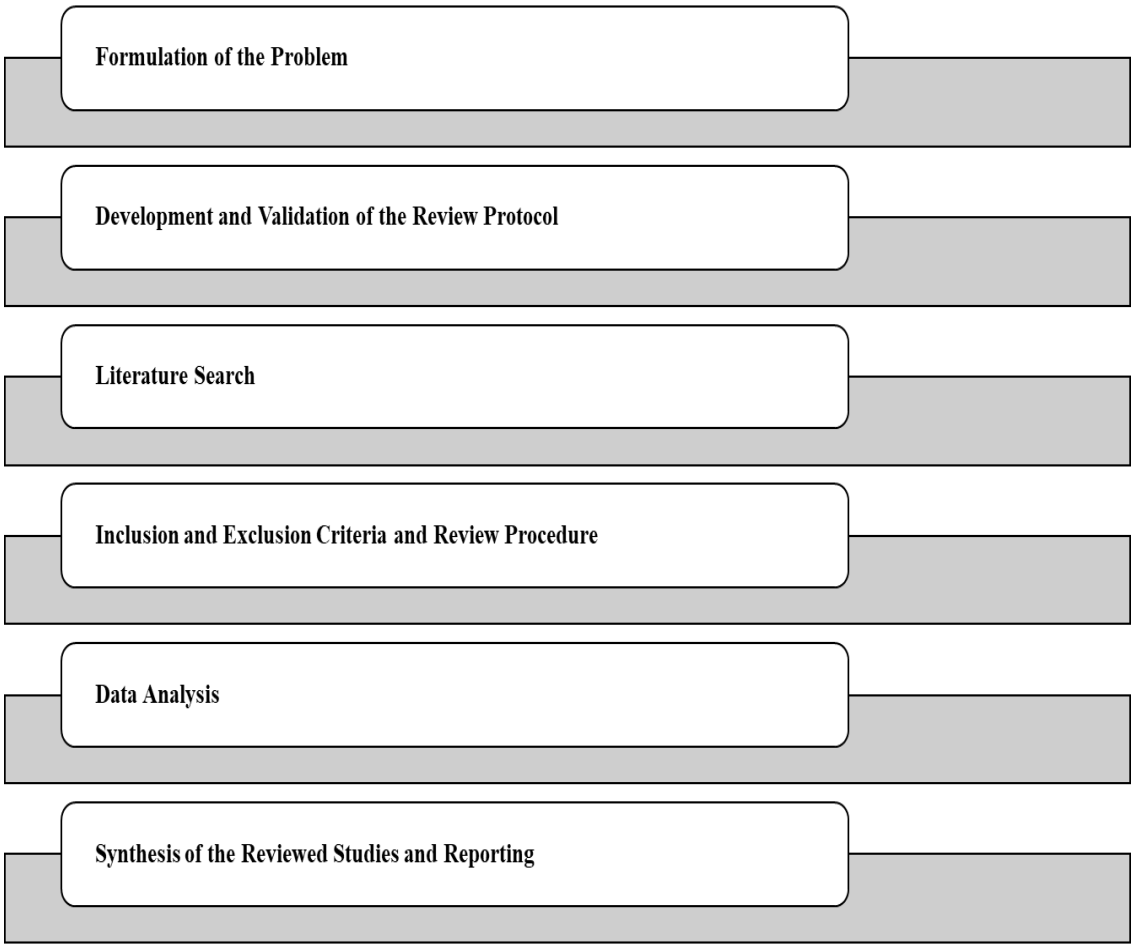
This is a systematic review study. Different from the existing review studies that bring only the quantitative studies together, in this paper, both qualitative and quantitative studies are reviewed to provide a holistic portrayal of the literature (Dixon-Woods et al., 2005). A systematic review is "a systematic process governed by a set of explicit and demanding rules oriented towards demonstrating comprehensiveness, immunity from bias, and transparency and accountability of technique and execution" (Dixon-Woods, 2011, p. 332). Review studies have an important role in advancing our knowledge by providing a holistic depiction of the existing work. They allow the researchers to identify gaps in the literature, test a specific hypothesis and/or develop new theories (Xiao & Watson, 2019). They further act as an information source for

policymakers, researchers, and practitioners when making decisions (Harden & Thomas, 2005).

In this paper, our intention was not to evaluate the quality of the studies we examined (Peters et al., 2015); instead, we aimed to portray the literature on CTD and CTS of pre-service teachers in Turkey. However, in scoping the review, we examined various areas of information specified in each study, including their methodology, findings, and independent variables (Arksey & O'Malley, 2005). Adopting the steps specified by Xiao and Watson (2019, p. 103), we employed the following actions: formulate the problem, develop and validate the review protocol, search the literature, screen for inclusion, assess quality, extract data, analyze and synthesize data, and report findings (Figure 2).

Figure 2

The Steps We Followed in Systematic Review of Research



Development and Validation of the Review Protocol

Validity and reliability are of primary importance to be considered in a systematic review. The use of review protocol ensures reviewers conduct a rigorous review (Kitchenham & Charters, 2007) and eliminates researcher bias (Okoli & Schabram, 2010). It also allows other researchers to repeat the study by using the same protocol (Xiao & Watson, 2019). For this reason, one of the authors developed a review protocol that included information regarding i) the purpose of the review and the research questions, ii) inclusion criteria, iii) search strategies, iv) exclusion criteria, and

v) how to synthesize and report the findings. The second author, who is an expert in conducting review studies that are used as a reference source, examined the protocol and the authors both agreed on the information to be included in our review protocol (e.g., inclusion and exclusion criteria)

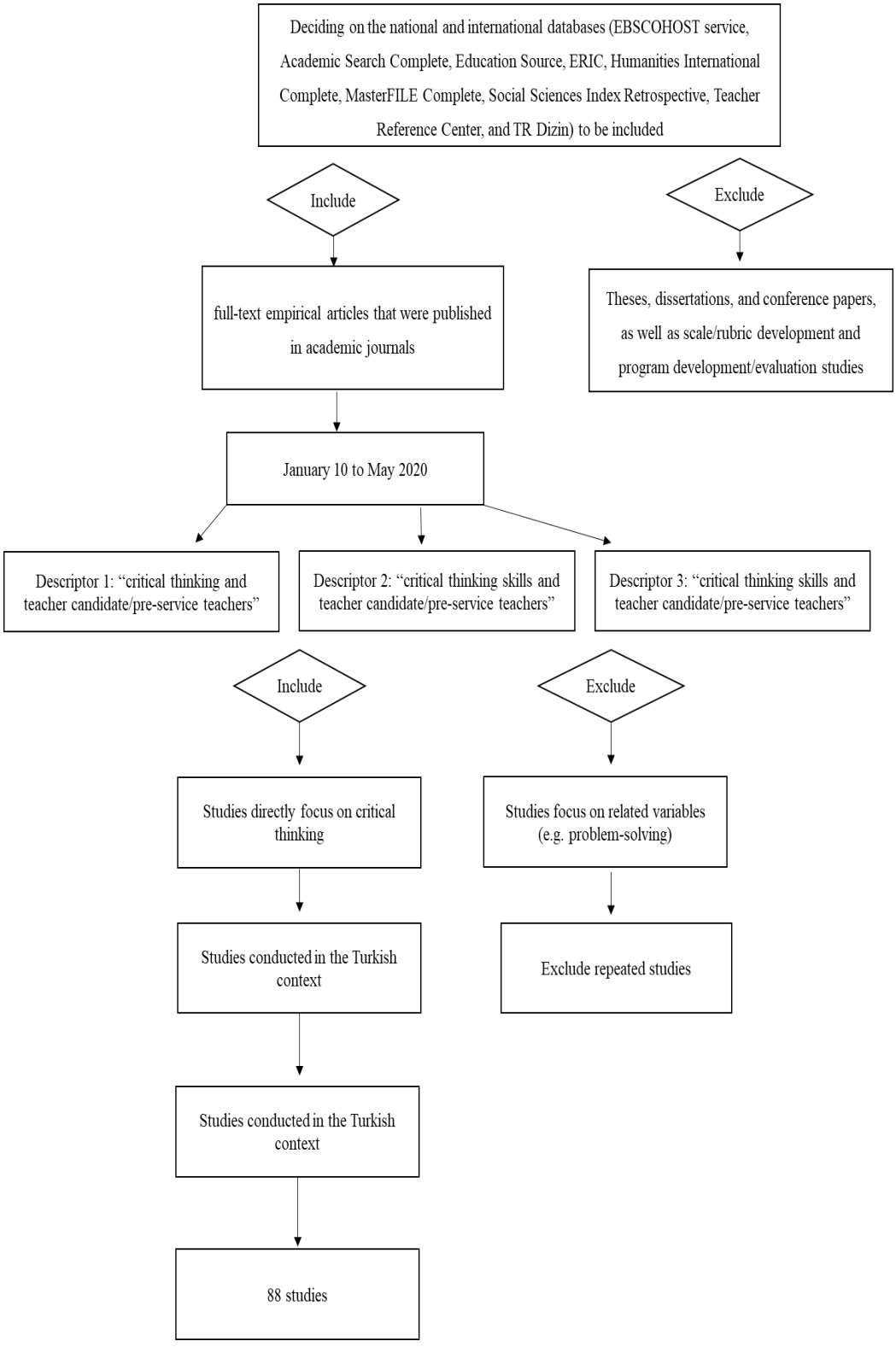
Literature Search

The educational research regarding Turkish pre-service teachers CTS and CTD was investigated in electronic national and international databases via EBSCOHOST service, Academic Search Complete, Education Source, ERIC, Humanities International Complete, MasterFILE Complete, Social Sciences Index Retrospective, Teacher Reference Center, and TR Dizin. The search was limited to the accessible full-text empirical articles that were published in academic journals. Theses, dissertations, conference papers, scale/rubric development, and program development/evaluation studies were not included for the feasibility of the study. The review was, moreover, restricted to the years from January 2010 to May 2020 to represent a recent portrayal of research conducted about teacher candidates' CTS and CTD within the last decade's educational context in Turkey.

While searching for the available studies, we first used "critical thinking and teacher candidate/pre-service teachers" descriptors. We reached 460 studies. After excluding studies that examine related concepts such as problem-solving and epistemological beliefs, we reached 93 studies written in the Turkish context. In the second search, we utilized "critical thinking skills and teacher candidate/pre-service teachers" as search terms resulting in 150 studies conducted with Turkish teacher candidates. Our search for the terms "critical thinking dispositions and teacher candidate/pre-service teachers," on the other hand, yielded 113 studies. We added eight studies to our search while examining the references of the studies we reached. Then, after a thorough review of the studies we reached, we omitted some of the studies in our review study as they do not pertain to CTS and CTD of pre-service teachers directly (e.g., studies conducted about reflective thinking skills, problem-solving skills, metacognition) or overlap with each other. Finally, we included 88 studies in this present review (Figure 3).

Figure 3

The Literature Review Process



Inclusion and Exclusion Criteria and Review Procedure

This study adopted an eclectic approach to defining CTS and CTD. We define CTS as a set of skills that include critical questioning, analysis, evaluation, making reasonable decisions, and finally, engaging in deliberate action. The term CTD is used to describe the willingness and awareness of using CTS consciously. However, as we detailed above in the conceptual background section, we also add that different than

these definitions, CT requires critical examination of critical issues in societies (e.g., power relations in society) and acting upon them to transform societies.

With these definitions in mind, the authors reached a consensus on the studies included in this review. The following criteria were employed as inclusion criteria:

- ✓ studies conducted years between 2010-2020,
- ✓ studies published in refereed journals indexed in the databases listed above,
- ✓ studies conducted with teacher candidates in Turkey,
- ✓ studies that directly examine CTS and/or CTD of teacher candidates,
- ✓ studies that are designed as survey, correlational survey, longitudinal, experimental, and quasi-experimental research,
- ✓ studies that employ qualitative research methodologies,
- ✓ studies that are written in English or Turkish.

If any of these criteria were not met, we excluded the study in our review. As a result, a total of 88 studies were included in our review (see Appendix for the list of the reviewed studies).

Data Analysis

In this review study, we employed a two-stage analysis. In the first stage, we completed the descriptive analysis of the studies included in this systematic review. In doing so, we examined various information such as the research design, data collection instrument, majors of the participants, variables, and key findings of the studies. Then, we content analyzed the studies to generate codes and themes (Miles et al., 2014) through careful reading of each article and bringing the studies together under relevant themes. In this stage, we completed a thorough examination of the conceptual framework adopted in the reviewed studies. Then, we both generated themes and compared our categorizations. We reached a consensus on the final themes through negotiations and following an iterative process to determine the themes. We list our findings under two main themes: traditional and critical perspectives. The first includes the following categories: CT as a higher-order thinking skill, CT as a self-controlled thinking process, CT as a developing skill, CT as a personal attribute, CT from a functionalist perspective, and CT as part of language skills. The categories CT as part of democratic citizenship and CT as a socially constructed skill are listed under the second theme.

Synthesis of the Reviewed Studies and Reporting

After a thorough analysis of the reviewed studies, we presented both descriptive and thematic findings. While doing so, we provided frequencies when necessary. We tried to follow a reader-friendly flow in our reporting. In the findings section, we presented what we found after reviewing the studies; however, we compared and contrasted our findings with the available national and international studies in the discussion and conclusion section. We also make conclusions considering our conceptual framework.

As for the reporting, we begin with an introduction to CT and its place in the field of education, particularly teacher education. Further, we briefly describe the context in Turkey. Then, we explain the conceptual framework we used to explain CT.

The second section presented the method we used to conduct our systematic review. Then, we reported both descriptive and thematic findings. Lastly, we discussed our findings. This last section made conclusions and suggestions for further research and practice.

Ethical Procedures

Since this is a systematic review study, ethics committee approval is not required. However, the ethical principles and rules in the Higher Education Institutions Scientific Research and Publication Ethics Directives are strictly followed during the study.

Results

This section presents our analysis of 88 studies under two main titles: descriptive results and thematic findings.

Descriptive Results

Under this title, we display the methodology used in the reviewed studies, as well as their key results on CT levels of pre-service teachers.

Research Design of the Reviewed Studies

To begin with the methodological results, our descriptive analysis revealed that most of the studies employed quantitative research designs (see Table 1).

Table 1

Type of Research Designs

Research design	Studies we reviewed
Correlation	1, 2, 3, 7, 11, 12, 13, 16, 18, 19, 20, 23, 24, 28, 32, 34, 35, 37, 40, 41, 43, 46, 47, 48, 50, 52, 54, 55, 56, 60, 63, 65, 67, 68, 70, 71, 72, 73, 78, 81, 87
Survey	5, 8, 10, 15, 21, 22, 25, 27, 31, 33, 36, 39, 45, 51, 53, 58, 62, 69, 74, 76, 77, 79, 82, 84, 85
Experimental	6, 9, 14, 17, 26, 30, 38, 42, 44, 49, 57, 64, 75, 80, 83, 86, 88
Qualitative	4, 29, 59, 61, 66

As displayed in Table 1, almost half of the studies we reviewed were designed as correlational research (*n*=41). The second most used research design was survey research (*n*=25). The others employed the following research designs: experimental research (*n*=17), case study (*n*=3), longitudinal study (*n*=1), and action research (*n*=1).

Participants of the Reviewed Studies

The participants included in the reviewed studies were students of different teacher education programs in Turkey (see Table 2).

Table 2

Participants of the Reviewed Studies

Departments	Studies we reviewed
Faculty of education	7, 8, 12, 13, 18, 34, 37, 48, 56, 62, 63, 67, 72, 73, 74
Primary school teacher education	1, 2, 3, 5, 11, 21, 23, 26, 31, 41, 45, 46, 47, 54, 55, 58, 65, 70, 71, 79
Science education	1, 16, 28, 38, 42, 44, 46, 47, 51, 70, 81, 83, 84
Elementary math education	16, 31, 35, 44, 45, 58, 66, 79, 83, 85, 88
Turkish language teacher education	9, 15, 25, 33, 47, 50, 58, 66, 79
Social studies teacher education	14, 20, 46, 47, 61, 82
Early childhood education	16, 21, 52, 57, 70, 75
English language teaching	17, 40, 77, 86, 88
Computer education and instructional technologies	6, 10, 16, 64, 68
Physical education and sports	19, 24, 54, 79
Religious culture and ethics teacher education	22, 27, 36
Psychological counseling and guidance	32, 65, 79
Biology education	71, 78
Music	53, 69
German language teaching	86
Arabic language teaching	30
Geography teacher education	39
Chemistry education	78
Physics education	78
Secondary school math education	78
History	4
Fine arts education	76
Visual arts education	80
Vocational education faculty students	87
Teacher candidates enrolled in a pedagogical formation program	43
Freshman students taking computing ii course and studying in the faculty of education	49
Pre-service teachers taking an intercultural communication course	59

As displayed in Table 2, the studies we reviewed included various departments to examine the CTS and CTD of the pre-service teachers. Among them, the math and

science departments were mostly involved in the studies. Nevertheless, pre-service teachers from a wide range of other departments, such as early childhood education and visual arts also participated in the research literature we reviewed.

Data Collection Instruments Used in the Reviewed Studies

The main instrument used in most of the studies was the California Critical Thinking Disposition Inventory (CCTDI), developed by Facione et al. (1994) and adapted to Turkish by Kökdemir (2003). There were also other instruments, as displayed in Table 3.

Table 3

Data Collection Instruments Used to Measure CTD of Pre-service Teachers

Data Collection Instrument	Studies we reviewed
California Critical Thinking Disposition Inventory (CCTDI) developed by Facione, et al. in 1994 and adapted to Turkish by Kökdemir (2003)	1, 2, 5, 6, 7, 8, 9, 14, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 30, 33, 34, 38, 39, 40, 41, 42, 43, 44, 45, 51, 52, 53, 54, 55, 57, 60, 62, 64, 65, 68, 69, 70, 72, 73, 76, 78, 79, 80, 81, 82, 84, 85, 86, 87, 88
Critical Thinking Standards Scale for Teacher Candidates' developed by Aybek et al. (2015)	31, 32, 35, 48, 49
Scale of Critical Thinking Tendency, developed by Ricketts and Rudd (2005) and adapted by Demircioğlu (2012)	12, 13
Critical Thinking Scale developed by Özdemir (2005)	15, 46, 50
Critical Thinking Disposition Scale developed by Akbıyık (2002)	23, 47
Critical Thinking Scale developed by Semerci (2000)	11, 67
Critical Thinking Disposition Scale developed by Sosu (2013) and adapted into Turkish by Akın et al. (2015).	56, 63
Scale of Critical Thinking Dispositions developed by Uluçınar (2012).	3
Critical Thinking Scale further developed by Semerci (2016)	77
Critical Thinking Scale developed by Saracaloğlu and Yılmaz (2011)	58
A questionnaire developed by the researchers & Rubric for analysis of the first-hand historical resources	4
Multidimensional 21th Century Skills Scale by Çevik and Şentürk (2019)	10
California Critical Thinking Disposition Inventory (CCTDI) developed by Facione, et al. in 1994	16

California Critical Thinking Disposition Inventory adapted to Turkish by İskifoğlu and Ağazade (2013)	36
CCTDI adapted to Turkish by Ertaş et al. (2014)	37
Cornell Critical Thinking Tests	71
Critical Thinking Skills Scale developed by Yoldaş (2009)	74
Watson-Glaser Critical Thinking Appraisal adapted to Turkish by Çıkrıkçı (1992)	75
California Critical Thinking Disposition Inventory adapted to Turkish by the authors	83
Interviews	17, 38, 59, 66
Pre-service teachers' comments and answers in the online community of practice	44
An open-ended question: "What does the concept of critical thinking mean for you?"	29
Reflective writing assignments	59
Preliminary and final assessment forms consisting of open-ended questions/individual & group reflective diaries.	61

Independent and background variables used in the reviewed studies

Our review of the studies showed that various variables were included as the unit of analysis in relation to CTD of pre-service teachers. They are listed below (Table 4 and Table 5).

Table 4

Independent Variables Used in the Reviewed Studies

Variables	Correlation	
	Significant	Non-significant
Learning style/approach	1, 18, 20, 33, 78, 84	
Metacognitive thinking skills and beliefs / problem-solving skills / locus of control / independent decision-making / reflective thinking	5, 11, 35, 48, 50, 56, 63, 72	
Educational beliefs / educational philosophy/attitude toward the teaching profession	7, 12, 43, 52	7
Reading habit	7, 19, 40, 41, 50, 53	
Media literacy	23, 37	
Academic self-efficacy	48, 56	
Reading strategies	50	
Attitude toward reading humor	74	
Moral judgment	71	

Epistemological beliefs	81	
Environmental ethics approach	70	
Individual innovativeness		68
Leadership orientations	65	
Multiculturalism values	3	
Attitudes toward multicultural education	13	
Empathy	34	
Personal values	60	
Social values	32	
Web 2.0 competencies	73	
Language competences	15	15

The independent variables used in the studies we reviewed are listed above in Table 4. As displayed, learning style/approach, metacognitive thinking skills and beliefs/problem-solving skills/locus of control/independent decision-making/reflective thinking, and educational beliefs/educational philosophy/attitude toward the teaching profession are some of those variables. While some are significantly correlated with CTS/CTD of the pre-service teachers, others reveal any significant relation, at all. For instance, plenty of studies investigated the relationship between learning style/approach/strategies. Among them, four studies (1, 33, 78, 84) report that there is a positive correlation between learning style and CTD scores of the pre-service teachers. However, in one of them (84), it was claimed that the relationship was negative for pre-service teachers with converger learning styles. Adopting a different categorization for learning styles, a study (18) reveals that pre-service teachers with tactile and kinesthetic learning styles had higher CTD scores. In the same study, CTD scores of the pre-service teachers were reported to be positively correlated with adopting a deep learning approach while it is negatively correlated with the surface learning approach. In another study (20), it was disclosed that there is a positive significant correlation between learning strategies (attention, development of short-term memory, retention enhancement, monitoring-guiding, and encoding) and CTD scores of the pre-service teachers. These variables; however, fall short in explaining the context and contingent nature of CT. Henceforth, some of the studies we reviewed also included background variables as the unit of analysis to examine CTS/CTD of pre-service teachers (Table 5).

Table 5

Background Variables Used in the Reviewed Studies

Variables	Correlation	
	Significant	Non-significant
Gender	2, 7, 12, 13, 21, 23, 25, 31, 35, 40, 51, 62, 63, 65, 74, 79, 84, 85, 88	1, 5, 10, 11, 15, 19, 22, 24, 27, 30, 32, 37, 39, 41, 45, 46, 47, 50, 53, 54, 55, 58, 69, 71, 72, 76, 77, 78, 81,

		86
Age	84	1, 16, 27, 30, 53, 65
University	65	1, 5, 50
Grade level	1, 2, 21, 23, 25, 33, 41, 45, 51, 55, 63, 74, 77, 84, 85	5, 7, 10, 11, 12, 13, 31, 32, 34, 35, 37, 39, 50, 55, 58, 62, 65, 69, 78, 79, 81
Achievement level	35, 40, 47, 58, 67, 71, 74, 76, 78	10, 15, 51, 86
Department / Subject area (discipline)	7, 12, 21, 47, 54, 58, 62	13, 27, 31, 34, 37, 40, 46, 65, 71, 76, 86
Department & Grade level	65	8
Success in the school practicum course	88	
Teaching experience		39
Receiving academic guidance from faculty members	5	
Education time (day classes/evening classes)	21	77
The field that pre-service teachers took the university entrance examination	79	
High school type	18, 69	1, 10, 22, 25, 27, 38, 39, 47, 53
Parents' occupation	22	51
Achievement level	35, 40, 47, 58, 67, 71, 74, 76, 78	10, 15, 51, 86
Department / Subject area (discipline)	7, 12, 21, 47, 54, 58, 62	13, 27, 31, 34, 37, 40, 46, 65, 71, 76, 86
Department & Grade level	65	8
Success in the school practicum course	88	
Teaching experience		39
Receiving academic guidance from faculty members	5	
Family income	22	47, 51
Perceived economic status		24, 53
Attitude of the family		24, 53
Number of siblings		22
Authority at home	5	
Place where the participants lived more /lived before starting at the university		22, 32, 65
Born city	22	

Region	22		
Childhood place	27		
Doing sports		24	
Internet use		73	
Blog use	73		
Daily TV watching		53	
Book reading frequency	53		
Newspaper reading frequency	53		

A myriad of background variables used in the studies we reviewed were presented in Table 5. To illustrate, gender was one of the background variables used in the studies we reviewed. Our analysis showed that while gender was a significant determinant of CTD of pre-service in some of the studies (2, 7, 12, 13, 21, 23, 25, 31, 35, 40, 51, 62, 63, 65, 74, 79, 84, 85, 88), more studies did not find any significant difference between gender and CTD scores of the participants (1, 5, 10, 11, 15, 19, 22, 24, 27, 30, 32, 37, 39, 41, 45, 46, 47, 50, 53, 54, 55, 58, 69, 71, 72, 76, 77, 78, 81, 86). In addition, almost two-thirds of the studies that report the significant correlation between the two variables also note that the correlation was significant in favor of female pre-service teachers (7, 18, 21, 23, 25, 31, 35, 40, 62, 74, 78, 79, 84, 88). Competing findings were reported also for grade level, achievement level, department, and other variables listed above in Tale 4. These findings indicate that it is not possible to explain CT by means of a single variable. We need a more holistic approach in the investigation of CT. For instance, the joint impact of independent and background variables might be examined.

CTS and CTD Levels of Pre-service Teachers

CTS and CTD levels of pre-service teachers were also examined in the studies we reviewed (Table 6). Here, it is important to note that although the researchers used the term CTS in their papers, the instruments they used in their studies originally measure CTD. Nevertheless, we presented the findings as they reported.

Table 6

CTS and CTD Levels of Pre-service Teachers

CTS and CTD levels	Studies we reviewed
Low-level	1, 2, 5, 6, 7, 8, 9, 10, 11, 14, 16, 17, 21, 25, 30, 32, 34, 36, 39, 40, 42, 43, 44, 52, 54, 63, 65, 67, 70, 71, 76, 78, 80, 81, 82, 83, 84, 87, 88
Medium-level	3, 15, 18, 19, 20, 23, 24, 26, 27, 28, 37, 41, 45, 55, 60, 62, 69, 73, 74, 77, 79, 85, 86, 88
High-level	12, 13, 22, 26, 31, 33, 36, 38, 46, 47, 48, 49, 50, 51, 57, 58, 64

As demonstrated in Table 6, pre-service teachers have mainly low-level of CTS and CTD. In contrast, less than one of five studies report high-level of CTS and CTD of pre-service teachers.

Results of the Studies that Employ Experimental Research

Our review yielded that some of the studies implemented educational interventions to improve CTS or CTD of the participants. While most of those interventions were reported as effective, some of them disclosed the non-significant impact of the treatment on CTS or CTD of the pre-service teachers (Table 7).

Table 7

Educational Interventions Used in the Reviewed Studies

Educational Interventions	Studies	
	Significant	Non-significant
Critical analysis of first-hand historical resources	4	-
Metacognitive guidance	6	-
Microteaching	9	-
Edward De Bono's skill-based thinking programme and content-based teaching	14	-
WebQuest-supported critical thinking instruction	17	-
Discussion and decision-making based activities	26	-
Online argumentation implementation	38	-
Socioscientific issues based instruction model	42	-
Community service learning	57	-
Video-based Reflection	59	-
Content-based critical thinking teaching on CTS	64	-
The effects of thinking skills education	75	-
The effect of different teaching styles	83	-
The impact of scenario teaching method on CTD	88	-
A program developed by the researcher	-	30
Online communities of practice	-	44
Use of feedback form	-	49
Incorporating critical thinking in the pedagogical content of a teacher education programme	-	86

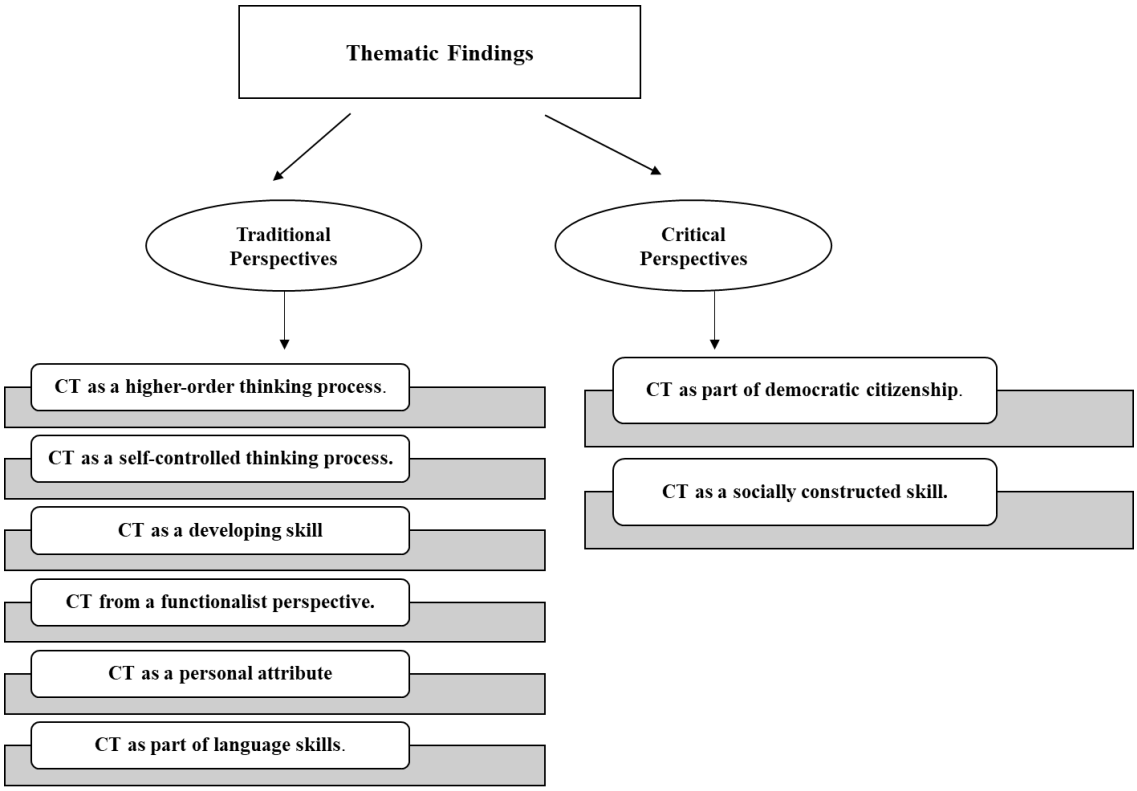
When we examined these studies, we found that educational interventions were employed within a course. Only a few studies were designed as a separate course or treatment. On the other hand, the treatments were mainly grounded on the tenets of problem-solving or argumentation in order to cultivate CT among the participants.

Thematic Findings

Our analysis of the studies included in this paper yielded two main themes: traditional perspectives and critical perspectives. The first theme is presented under six categories: CT as a higher-order thinking skill, CT as a self-controlled thinking process, CT as a developing skill, CT as a personal attribute, CT from a functionalist perspective, and CT as part of language skills. The second theme is displayed under two categories: CT as part of democratic citizenship and CT as socially constructed skill (Figure 4).

Figure 4

Thematic Findings



Traditional Perspectives

This theme includes studies that adopt the traditionalist approach to define CT. As defined in those studies, CT is mainly perceived as a cognitive process that includes thinking skills such as reasoning and problem-solving. Although we presented the theme under different categories, it is important to emphasize that those categories are not independent of each other, rather represent interwoven aspects of CT. Therefore, some of the studies are listed in more than one theme.

CT as a Higher-Order Thinking Process. The review results indicated that CT was specified as a higher-order thinking process in almost half of the studies (*n*=37) (9, 11, 12, 14, 17, 21, 23, 24, 25, 26, 27, 28, 29, 31, 32, 35, 36, 38, 41, 45, 50, 51, 52, 55, 56, 60, 69, 70, 71, 72, 74, 76, 77, 84, 85, 87, 88). For instance, in study 14, the CT definition of Facione et al. (1994) was adopted: "higher-order reasoning used in reaching professionally informed judgments in high-stakes, time-constrained, and many

times, novel problem situations" (p. 41). Moreover, some of these studies (e.g. 24, 31, 41, 45, 69) note that CTS, as a higher-order thinking skill, was among the demanding skills of the information era. CTS was also perceived as an important skill in students' learning in some of the studies we reviewed (e.g. 35, 36, 55). On the other hand, in some of the studies (e.g. 1, 52, 57), CTS was claimed to be an essential component of the teacher education programs and the teaching profession.

CT as a Self-Controlled Thinking Process. The findings of our review also reveal that CT is categorized as a self-controlled thinking process. These studies point that CT is a self-organized and self-controlled thinking process that yield a purposeful decision-making (*n*=45) (1, 2, 3, 7, 8, 11, 15, 18, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 33, 35, 36, 38, 39, 40, 43, 44, 47, 48, 50, 51, 53, 55, 56, 58, 62, 64, 65, 66, 72, 73, 77, 83, 84, 87, 88). In these studies (e.g., 2, 3, 7, 8, 21, 29), it was reported that CT requires deliberate actions such as problem-solving and seeking evidence and using those skills in different contexts. In other words, as most cited in these studies, CT is an active and organized mental process that enables us to understand our own thinking and decision-making processes). The underlying actions in these definitions include analyzing, rational thinking, seeking evidence, and making informed decisions. Additionally, it is exclaimed that CT is a self-controlled process that also contains one's reflecting on her/his own thinking process and decision (e.g., 72, 73, 87). On the other hand, some of those studies (e.g., 1, 33, 44) underline that CT is an important aspect of teaching and learning because teachers who are aware of their own teaching styles and strategies can effectively organize learning environments. Besides, in study 23, it was claimed that CT is a prerequisite of media literacy as individuals who can think critically, question and seek to understand the causes of events.

CT as a Developing Skill. Another theme that emerged in our review was CT as a developing skill (*n*=69) (4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 21, 22, 24, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 67, 69, 70, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 87, 88). Almost all of these studies (e.g., 6, 9, 15, 18, 22, 24, 27, 51, 61, 66) emphasize that educating teachers as critical thinkers is instrumental since teachers who have CTS are reported to be more effective in the teaching of CT. Those studies also suggest ways of improving CTS of pre-service teachers. For instance, in study 88, it was reported that CT could be developed through implementing a problem-based learning method in the classes. Similarly, in study 87, it was claimed that incorporating CT in teacher education programs might help pre-service teachers to develop CTD. Another genre of studies listed under this theme draws our attention to the importance of developing CT as one of the 21st-century skills (e.g., 10, 45, 62). Some of the studies (e.g., 11, 14, 21, 26, 47, 58, 63, 79) report that the national curricula in Turkey aim to equip students with CTS. These studies also support the idea that to help students develop CTS, teachers should be educated to have those skills.

CT from a Functionalist Perspective. Our review unveil that a considerable amount of studies adopts a functionalist perspective to explain CT (*n*=39) (2, 10, 12, 22, 23, 24, 27, 28, 29, 31, 32, 34, 35, 36, 37, 40, 41, 44, 45, 47, 51, 53, 56, 58, 60, 62, 63, 66, 68, 70, 71, 75, 76, 77, 80, 82, 83, 84, 85). Almost all of these studies underline that people should have certain skills (mostly referred to as the 21st-century skills) such as CT in order to survive in this information and communication era as a global citizen

(e.g. 10, 22, 23, 24, 27, 28, 29, 31, 35, 36, 37, 40, 44, 53, 63, 77). It is further noted that individuals with CTS contribute to social and economic development of their society (e.g. 2, 12, 28, 60). Built on this assumption, CTS and CTD are perceived as vital skills demanded in the market (34, 37, 75, 85). In this regard, teachers are attributed a critical role in developing students' CTS and CTD (32, 56, 68, 82).

CT as a Personal Attribute. Contrary to those studies that perceive CT as a developing skill, some of the studies (1, 5, 7, 18, 27, 43, 52, 54, 56, 68, 76, 78, 81, 85) define CT as a personal attribute. These studies mark that individual differences are important in CTD (e.g., 1, 7, 56, 76). Some of them contend that CTD is a gender-related personal attribute (e.g., 27, 45, 78). Besides, those studies address that teacher characteristics affect the efficiency of teaching-learning processes, particularly in the teaching of CTS (e.g., 1, 52).

CT as Part of Language Skills. The last category under traditional perspectives is CT as part of language skills. These studies note that CTS is critical in acquiring language skills (15, 16, 33, 40, 50, 54, 59). For example, it was argued that teacher candidates' CTS is significantly correlated with their self-efficacy beliefs in reading and speaking skills. In study 33, furthermore, it is claimed that CTS has an important role in teaching basic language skills (reading, writing, listening, speaking).

Critical Perspectives

This theme represents the views that are relatively critical in their approach to CT. Two categories are displayed under this theme: CT as part of democratic citizenship and CT as a socially constructed skill.

CT as Part of Democratic Citizenship. The review results show that CT was defined as part of democratic citizenship in some of the studies (3, 13, 14, 27, 39, 42, 51, 62, 71, 78, 82). These studies emphasize that citizens who can think critically contribute to the development and sustainment of democratic societies (e.g., 27, 39, 62) since they do not have dogmatic thoughts yet are socially responsible and willing to take action (39) through applying various CTS such as constructing their own thoughts, seeking for evidence, and evaluating information to make informed decisions. The studies also remark that teachers play a critical role in educating students as critical thinkers who ask questions, are open-minded, and are aware of real-life issues (e.g., 51, 82). In one of these studies (13), multicultural education was enunciated as part of democratic citizenship education that prioritizes democratic values, cultural pluralism, and social justice, all of which can be achieved by educating critical thinkers. Another study (71) argued that democratic citizenship requires CTS and moral judgment competences. The author explicates that in this era, these skills are crucial in creating an ethical world culture.

CT as a Socially Constructed Skill. We reviewed a few studies that designate CT as a socially constructed skill (5, 13, 39, 40, 48, 52, 82). These studies remark that social factors influence CTS and CTD of pre-service teachers. For instance, it was delineated that the culture individuals are born and grew up shapes CTS and CTD of individuals (13, 40). Other studies draw our attention to the family background (39, 52, 82), media and political authority (39), interaction among individuals (48), and socioeconomic status (82) as background variables that impact CTS and CTD of pre-service teachers.

Discussion and Conclusion

CT is one of the pivotal skills of the 21st century that enables individuals to ask questions and make reasonable decisions. Schools, in this regard, are accepted as the key institutions in which the youth learn how to think critically through engaging in an organized process and teachers are attributed a critical role in facilitating that process (Lewis & Smith, 1993). The process is also highly dependent on teachers being trained on the teaching of necessary skills (Kong, 2001). Inherent to this argument, teacher education programs attempt to integrate CT into their curricula to furnish future teachers as critical thinkers. This systematic review aimed to situate the current literature on CTS and CTD of pre-service teachers in Turkey and make connections for further research and practice.

A salient finding of our review was that despite the growing attention of CT in teacher education, pre-service teachers in Turkey have mainly low- or medium-level of CTS and CTD. Both traditional and critical perspectives explicate their arguments for the low level of CTS and CTD. From the traditionalist perspective, the endurance of low-level CT is two-fold. The first is derived from the inadequacy of educational experiences in leading to higher-order thinking skills (Lai, 2011; Paul, 1992). This problem directs our attention to the curricula and mundane practices at the school and classroom levels and how or whether they foster CT. The second is related to the educators' lack of a "knowledge base with respect to thinking skills and the mechanisms that govern their development" (Kuhn, 1986, p. 496). This statement urges a need for designing teacher education programs to empower teacher candidates as critical thinkers and provide learning environments in which they learn how to integrate those skills and dispositions into their teaching. On the other hand, from a critical perspective, it is argued that CT embraces a more holistic meaning than it is defined by positivist perspectives (Burbules & Berk, 1999). It requires providing learners and educators with opportunities in which they realize and question power relations in their society to change them (Sibbett, 2016). In the case of student teachers, we argue that teacher education programs should foster teacher intellectuality by enabling them to discuss and reflect on critical issues in their society. We should also teach them how to remove the barriers restricting teacher autonomy, such as high-stakes testing (Apple, 2001; Au, 2009).

Another important finding was that, adopting the traditional perspective, most of the papers employed quantitative methods in their research design. Among them, correlational and survey studies dominate the field, and only a few studies adopted a qualitative approach. In recent reviews of CT tendencies (Cansoy et al., 2018; İşlek & Hürsen, 2014), similar findings were reported. The international literature also supports these findings (Abrami et al., 2008; Pithers & Soden, 2000). These studies mainly adopt a generalist view that defines CTS as a set of generic skills that can be applied to any context (Davies, 2011).

Entrenched with the domination of quantitative research methods, we found that mainly standardized tests or surveys (i.e., California Critical Thinking Disposition Inventory, Watson-Glaser Critical Thinking Appraisal, and Cornell Critical Thinking Tests) were used as the data collection instrument. In their review of CT assessment in higher education, Liu et al. (2014) report identical findings. They list the widely used instruments as California Critical Thinking Disposition Inventory, Watson–Glaser

Critical Thinking Appraisal, Ennis–Weir Critical Thinking Essay Test, and Cornell Critical Thinking Test. Nevertheless, the use of these instruments may not yield reliable and valid results for every context (Moss & Koziol, 1991). In his early research, Ennis (1964) draws our attention to subject-specific assessment. He explicates that subject-specific tests should be developed since CT is, to some extent, a field-specific ability. Supporting him, Facione (1990) remarks that focusing on only the skills falls short in capturing the fullness of CT. He further recommends that:

> Different kinds of instruments should be employed, depending on which aspect of CT is being targeted and where students are in their learning -the introductory stage, the practice stage, the integration stage or the generalized transfer stage. Although the veteran CT instructor can assess students continuously, CT assessment should be made explicit to reinforce its worth in the eyes of the students, their families, and the public. It should be made explicit to support the goals of educators seeking to improve the curriculum. And it should be made explicit to properly inform educational policy formation (pp. 35-36).

Hereof, Lai (2011) draws our attention to the various challenges in assessing CT and suggests alternatives such as the use of i) open-ended questions instead of multiple-choice items, ii) authentic problem contexts, iii) ill-structured problems, and iv) materials that require judgment.

Due to the challenges in assessing CT, a genre of literature examines the relationship of CT with some other variables to better understand the nature of CT. In our review, we realized that both independent variables, that are accepted as part of higher-order thinking (i.e., metacognition, problem-solving, etc.), and background variables (i.e., gender, grade level, etc.) were investigated in relation to CT. Metacognition was one of those variables. It is defined as "the knowledge and control children have over their own thinking and learning activities" (Cross & Paris, 1988, p. 131). It requires one's awareness of own thinking (Hennessey, 1999). By definition, it is widely used in the studies we reviewed and in the international literature (e.g., Halpern, 1998; Kuhn, 1999; Sternberg, 1986). This strand of literature presents metacognition as an umbrella term that captures CT. Nevertheless, some studies address CT and metacognition as interrelated but distinct constructs (e.g., Lipman, 1988; McPeck, 1990).

Creativity was another independent variable that made connections to CT in our review and international literature (e.g., Bonk & Smith, 1998; Ennis, 1985; Paul & Elder, 2006). It is argued that "critical thinking without creativity reduces to mere skepticism and negativity, and creativity without critical thought reduces to mere novelty" (Paul & Elder, 2006, p. 35). In the studies we examined, the other most used variable as the unit of analysis in relation to CT was problem-solving. The international literature (e.g., Fisher & Scriven, 1997) reports that since problem-solving is a process in which one engages to solve an unfamiliar situation, it is an important aspect of CT. Nonetheless, it is important to differentiate CT from other forms of thinking. Bailin and Siegel (2003) criticize the psychological view to explain CT in many ways. First, the authors list, it is almost impossible to claim a correlation between mental operations and good thinking. Second, CT does not refer to performing a predetermined set of procedures rather it is contextual. Third, the terms used to define CT refer to tasks requiring thinking. Considering these arguments, investigation of CT as a stand-alone phenomenon that is closely related to forms of higher-order thinking is essential. Such a

perspective will be useful in understanding the context-dependent and complex nature of CT.

Moreover, a growing body of literature has used background variables to contribute to the field. The study of the background variables is important to understand how individuals with different backgrounds engage in CT and how CT becomes part of their identity (ten Dam & Volman, 2004). Chief among those variables is gender. Our review yielded conflicting results, in this context. In 52 of the studies that included gender as the unit of analysis, more than half of the studies reported the non-significant effect of gender. This finding is supported in a previous review of teacher candidates' CTS (Cansoy et al., 2018). Likewise, Üredi and Kösece (2020) recently reported the non-significant impact of gender on CT. In contrast, the significant effect of gender was reported in 22 of the studies we reviewed. An intriguing finding was that contrary to the studies that claim the possible gender bias in favor of males (Wheary & Ennis, 1995), more than half of those studies found a significant difference in favor of females. In explaining this finding, we refer to Belenky et al. (1986). The authors remark that CT does not fit in the woman's way of knowing as an androcentric concept. Women, rather, prefer connected knowing that enables one to think beyond her/his knowledge, share and collaborate. The nature of women's knowledge, in this regard, enables women to think of alternatives and reflect on their thinking that is part of CT. This fact might explain the significant, though slight, difference in CTS between female and male students.

Some of the other background variables included grade level (significant, *n*=15; non-significant, *n*=21), achievement level (significant, *n*=9; non-significant, *n*=5), department (significant, *n*=7; non-significant, *n*=10), age (significant, *n*=1; non-significant, *n*=6), high school type (significant, *n*=2; non-significant, *n*=9), and family background (significant, *n*=4; non-significant, *n*=8). As the results indicate, it is not possible to claim that a single variable, no doubt, explains CT. According to Roohr et al. (2019), there are both individual and institutional variables that affect CT of students in higher education. The authors assert that institutional variables such as student-faculty ratio explain 15% of the variance between estimated CT scores, while demographic variables such as gender and race all added less than 2.5% variance. Indeed, the inconsistent results might be attributed to the complex nature of CT. Other factors should be investigated about CT to capture the fullness of CT. In this regard, Gellin's (2003) meta-analysis reveals that factors such as involvement in clubs/organizations and peer interaction might influence CT of students. Likewise, it is noted that out-of-class activities are likely to foster CT of college students (Twale & Sanders, 1999). This finding implies that teacher education programs can integrate these promising learning experiences to foster teacher candidates' CT.

Considering the findings mentioned above, it is possible to conclude that the complexity of CT does not allow for robust findings across studies. The predicament in understanding CT has directed scholars to find effective ways of teaching CT. In our review, 17 studies employed experimental research designs to empower teacher candidates as CT. The treatments include but are not limited to metacognitive guidance, microteaching, Edward De Bono's skill-based Cort1 thinking program, WebQuest-supported critical thinking instruction, and discussion and decision-making-based activities. Most of those treatments are found to be effective in fostering CT. The

common features of these studies can be listed as i) empowering students to discuss, analyze, and reflect on their thinking, ii) fostering peer interaction, and iii) enabling the participants to practice the theoretical knowledge. The other characteristic these studies share is that the treatment is implemented within an existing course. Supporting our interpretation, it is claimed that a collaborative or cooperative learning environment fosters CT (Bailin et al., 1999; Bonk & Smith, 1998; Paul, 1992; Thayer-Bacon, 2000). In their review, Pithers and Soden (2000) report the consensus among scholars about the effectiveness of learning environments in which learners construct and reflect on their learning, as well as develop metacognitive knowledge and skills. Specifically, Dennick and Exley (1998) note that small group teaching is effective in enhancing CT. Similar procedures, including fish bowling, the creative-controversy model, are promoted by Baloche et al. (1993). The authors argue that cooperative learning environments lead to improvement in CT.

Given the contradictory results regarding the effective teaching of CT, it is possible to conclude that although it is evident that certain learning activities such as discussion and collaboration foster CT, there is not a standardized way of teaching for CT. In his prolific article, Willingham (2008) asks and answers why it is so hard to teach CT, so here it is worth quoting him:

> First, critical thinking (as well as scientific thinking and other domain-based thinking) is not a skill. There is not a set of critical thinking skills that can be acquired and deployed regardless of context. Second, there are metacognitive strategies that, once learned, make critical thinking more likely. Third, the ability to think critically (to actually do what the metacognitive strategies call for) depends on domain knowledge and practice (p. 26)

That is, the context-dependent nature of CT should be considered in the teaching of CT and learners should be empowered to apply the strategies they learn. Further, it is important to note that CT also embraces certain attitudes and values, as well as the willingness to think critically. Therefore, CT can be categorized as a competence rather than a set of generic skills.

Our review mainly yields that CT is defined from a traditionalist perspective in most of the studies focusing on CT as a higher-order thinking process, a self-controlled process, a developing skill, a functionalist perspective, a personal attribute, or a part of language skills. These studies presume that CT is one of the key, the topmost, skills that require higher-order thinking (Doğanay et al., 2007; Seferoğlu & Akbıyık, 2006; Semerci, 2000). CT as a self-controlled process was also investigated in most of the studies we reviewed. Earlier research in the Turkish context also defines CT as a disciplined and self-controlled thinking process (Gök & Erdoğan, 2011). Similarly, in defining CT, Kuhn and Dean (2004) emphasize being aware of one's own thinking and reflecting on the self-thinking and others' thinking as well.

Our review shows that CT is also perceived as a skill that can be developed. These studies note that one can develop CT through attending educational settings that promote CT (Doğanay &Yağcı, 2011; Halpern, 2001). Those studies attribute teachers to a critical role (Evans, 2010; Paul et al., 1997). They also mark that it is therefore important to train pre-service teachers as CT. In this regard, the Turkish Council of Higher Education (TCoHE) has also revised the teacher education programs to integrate CT into the programs in 2006.

From a functionalist perspective, CT is accepted as one of the pivotal skills of the 21st century. This perspective is based on the assumption that individuals who can think critically can contribute to the development of their society; henceforth, CT is listed among the topmost skills all professions require. In their influential report, Casner-Lotto and Barrington (2006), in collaboration with the Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management, remark that although the three Rs remain important to a new beginner, applied skills such as Teamwork/Collaboration and Critical Thinking are listed as critical indicators of success at work. This shifts our attention to the role of education in the teaching of CT. Educating active citizens cannot be achieved without critical teachers. Therefore, CT is stated as one of the key teacher competences that should be part of teacher education and professional development (European Commission, 2013).

Another strand in our review addresses CT as a personal attribute. These studies claim that critical thinkers think differently than those who do not think critically. They tend to look behind the scenes, search for further information to reach the truth, and are willing to provide solutions to the problems they face (Özdemir, 2005). This reminds us that CT is a thinking process in which skills and personal traits are interwoven. Supporting these assumptions, Siegel (1999) remarks that having skills does not guarantee their application. Put differently, CT require not only certain skills but also the awareness of when to use those skills and willingness to use them (Facione, 2000; Halpern, 1998).

The studies viewing CT as a part of language skills argue that the development of language skills and CTS are highly correlated (e.g., Moore, 2011) since critical thinkers are aware of their progress and are more autonomous in language learning (Atkinson, 1997). Much of the existing scholarly work examines CT in relation to writing and reading skills (e.g., Auerbach & Paxton, 1997; Daud & Husin, 2004). These studies indicate that there are CT and language skills at the core of higher-order thinking. On the one hand, the development of language skills is dependent on CTS which enables one to understand and make inferences. On the other hand, CT requires effective use of language skills in communicating thoughts.

Despite the prevailing impact of the traditional perspective, critical voices have also been included in the academic sphere. According to Farber (1991), the traditional perspective of CT set boundaries between the truth and the self in the name of objectivity while underestimating emotional and physical aspects of thought. Echoing Farber's arguments, Fernandez-Balboa (1993) problematizes the taken-for-granted interpretations of CT. In doing so, the author asks a list of questions such as:

> Who determines what phenomena, situations, questions, or problems need to be critically examined? ...When we talk about available information, whose information are we referring to? ...When we say that a particular phenomenon is being convincingly justified, according to whose viewpoint or standard would it be convincing or justified? (p. 63)

These criticisms open new rooms in the scholarly literature while allowing for flexibility in the interpretation of what CT is. Democratic citizenship, amongst the critical perspectives, embraces that CT is a key aspect of democratic societies (Facione, 1990) since individuals who can make informed decisions can contribute to the development of democracy (Paul et al., 1997). This is where democratic competence, as

defined in the Reference Framework of Competences for Democratic Culture (Council of Europe, 2018), and CT overlap. Here, it is important to underline that although traditional perspectives of CT mention democratic citizenship, our categorization fits under the critical perspectives since, while talking about democratic citizenship, we not only refer to pluralism or voting but also do capture the solidarity and commitment to social justice, as Sibbett (2016) puts it. Following the critical educators, we contend that schools are political, moral, social, cultural, and instructional institutions in which students learn how to participate in the building of a democratic society as active transformative agents (Apple & Beane, 2007; Giroux, 2010). Accordingly, empowering teachers as transformative intellectuals, in Giroux's (1988) terms, who create learning environments in which critical problems of society are presented and students exchange ideas with an awareness of multiple perspectives, is crucial. Put differently, teachers who are trained to think critically as part of intellectuality can foster students' CT and stimulate student engagement in solutions to the critical problems of their societies.

CT as a socially constructed skill under critical perspectives, views CT as a skill that is dependent on the social environment and the culture we interact with. Contrary to the traditional perspectives that attribute certain personal and genetic characteristics, this strand of literature puts that background variables such as family background are influential in one's ability to think critically. Atkinson's (1997) depiction of CT embraces supportive arguments. He exclaims that CT is a covert social practice and it is culture-dependent by writing that:

> what we commonly refer to as critical thinking maybe an organic part of the very culture that holds it up as an admirable achievement—more at the level of common sense than a rational, transparent, and—especially—teachable set of behaviors. (p.72)

This is important in two ways. First, the culture-dependent nature of CT limits the one-size-fits-all approach to thinking critically. That is CT can be better improved by considering the individuals' social/economic/cultural background. Heath's (1983) iconic study of middle-class children's early socialization provides evidence for this assumption. She reports that nonmainstream groups have difficulties in issues such as asking and answering questions in general, why, and how questions in particular, which results in failure in the classroom. Put differently, despite the traditional approach that casts certain individual attributes (e.g., gender and race) as indicators of better CT, her study bespeaks re-conceptualization of CT considering the social environment we are destined that causes "inequality at the starting gate" (Lee & Burkham, 2002).

Second, if CT is a socially-constructed skill, we should re-consider the aim of education in general, and the role of schools in particular. In his monumental "Class, Code, and Control," Bernstein (2003) depicts that schools reproduce class differences as "…children's consciousness is differentially and invidiously regulated according to their social class origin and their families' official pedagogic practice." (p. 206). His arguments become more visible in regards to CT that students of poverty are hardly expected to think critically at home. Moreover, schools reproduce their class while pacing/sequencing rules legitimize the schools' dominant pedagogic code. If we want our students to think critically, we should transform our schools to provide equality of educational opportunities to each student, other than designing them as institutions where students learn social norms and values; social coercion is secured; and division of labor is ensured. Nevertheless, this is not a taken-for-granted aim of education. Paulo

Freire (2018) remarks that there are some drawbacks in front of teachers and students critically. Teachers, Freire explains, are afraid of losing their job, being alone, and oppression by the dominant groups. Similarly, he continues, the students feel the pressure of the standardized tests and are obliged to develop certain skills and knowledge starred in the market to be employed right after graduation. One way of transforming schools as agents of change is to enable teachers and students to develop critical consciousness. This can be achieved only by teachers and students who question the sovereign powers and aim to build a just society. Therefore, re-designing teacher education programs is important to reflect those assets of CT.

As a corollary, our review unveils that the traditional perspectives dominate the field. Inherent to these standpoints, the studies mainly employ quantitative research methods and use ready-made scales to measure CTS and CTD of pre-service teachers. These studies report the low level of CTS of the participants. Furthermore, adopting the traditional perspective, most of the studies used independent and background variables in their unit of analysis to explain CT. These findings indicate that CT is mainly perceived as part of higher-order thinking that downgrades CT into a set of generic skills that are easily measurable. CTS is also defined as rational thinking and reasoning that reflects man's way of knowing. We further mark that the overemphasis on rationality attributes certain personality traits as indicators of being better at thinking critically. It also neglects the role of the social and cultural environment we are destined in shaping our ways of thinking. Although some studies utilize socioeconomic status or family background in relation to CT, they use numeric data in their explanation. To us, nonetheless, cultural habitus embraces a more complex meaning than presented through numbers. For instance, linking the number of books we read in a month might provide insights about CT but do not explain critical questions such as how we interact with books and why we read books.

In order to overcome the aforementioned problems, we should first change the way we define CT. That is, we should push the boundaries of the prescriptive perspective and capture a holistic perspective of CT by appreciating different forms of thinking and cultural influence on individuals' ways of thinking. Further, as critical educators, we should "construct an emancipatory curriculum which legitimates the postmodern condition of mass culture in order to help students both criticize and transcend its most disabling conditions." (McLaren & Hammer, 1989, p. 55). Critical pedagogy, in this regard, can help produce counter views to hegemonic meanings since:

> The future does not belong to those who are content to remain as they are, and who unwittingly unlearn the meaning of hope, but to those who can think and act as critical re-makers of history, and who choose to do so. (p. 56)

Therefore, we should redesign teacher education programs in order to train our future teachers as critical educators. We should explicitly include CT in teacher education programs by incorporating alternative content, classroom activities and assessment methods.

Implications

Regarding future studies, we urge curriculum development studies at teacher education programs with an emphasis on critical perspectives of CT. This will help educate pre-service teachers as critical educators to educate their students as critical

thinkers who actively participate in transforming their societies. Second, available empirical research was mainly short-term projects. There is a need for longitudinal studies since CT is not a ready-to-develop skill. Personal characteristics, cultural differences, and educational experiences are some of the predicaments behind thinking critically. To handle these barriers, educators need more time than a school semester. Besides, those studies mainly adopt the traditional perspective of CT. Future research might be formulated considering the critical perspectives of CT that emphasize critical participation in social practices. In this way, teacher candidates would be given the opportunity to experience critical agency in which they reflect on problems that are relevant to their cultural and personal identity. Such research would also allow us to (re)think about our educational practices that superior certain identities over others in terms of CT and change them to reflect an inclusive approach that favors pluralism and different modes of thought.

Statement of Responsibility

This article was written by two authors. The aim and scope of this study were determined by two of them. The conceptualization of the study was also completed by the two authors. The first author was responsible for the review of the studies to be included in the study, analysis of the studies, and writing original draft. The second author provided feedback for the methodology and analysis. He also reviewed and edited the original draft. The final version of the paper was prepared by the two authors.

Conflicts of Interest

The Authors declare that there is no conflict of interest.

Author Bios

Ozlem Yildirim Tasti is a research assistant at the Curriculum and Instruction Department, Aksaray University. She has recently completed her Ph.D. in the field of Curriculum and Instruction at Middle East Technical University (METU) where she also had her master's degree in the same field. She has worked as a researcher on national and international projects. Her main research interests include critical issues in K-12 education and teacher education. She is passionate to unravel drawbacks in front of creating just education systems.

Ali Yıldırım is a full professor at University of Gothenburg Faculty of Education Department of Pedagogical, Curricular, and Professional Studies. His current research focuses on teacher education, teaching-learning processes and curriculum studies. He is the contact person for Didactic classroom studies research environment, and the research leader of a SRC funded project on development of novice teachers´ assessment literacy. The courses he teaches focus on theories and methods in educational sciences. He has been involved in the past ten years in numerous European Union Projects that focused on active citizenship, lifelong education, climate friendly schools, educational networks and assessment of informal learning outcomes. The most recent project, GREEN, aimed to establish a network among European schools on climate change education, and his current research on network learning is an extension of the activities of this project. He also served as curriculum development and research consultant at three large scale World Bank funded education development projects in Turkey.

References

Abrami, P. C., Bernard, R. M., Borokhovski, E., Wade, A., Surkes, M. A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78*(4), 1102-1134. https://doi.org/10.3102/0034654308326084

Apple, M. W. (1993). What post-modernists forget: cultural capital and official knowledge. *Curriculum Studies, 1*(3), 301-316. https://doi.org/10.1080/0965975930010301

Apple, M. W. (2001). Markets, standards, teaching, and teacher education. *Journal of Teacher Education, 52*(3), 182-196. http://dx.doi.org/10.1177/0022487101052003002

Apple, M. W., & Beane, J. (2007). *Democratic schools: Lessons in powerful education* (2nd ed.). Heineman.

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, *8*(1), 19-32. https://doi.org/10.1080/1364557032000119616

Aronowitz, S., & Giroux, H. A. (2003). *Education under siege: The conservative, liberal and radical debate over schooling*. Routledge.

Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly, 31*, 71-94. https://doi.org/10.2307/3587975

Au, W. (2009). Social studies, social justice: W(h)ither the social studies in high-stakes testing? *Teacher Education Quarterly*, *36*(1), 43-58.

Auerbach, E. R., & Paxton, D. (1997). "It's not the English thing": Bringing reading research into the ESL classroom. *TESOL Quarterly, 31*(2), 237-261. https://doi.org/3588046

Bailin, S., Case, R., Coombs, J. R., & Daniels, L. B. (1999). Conceptualizing critical thinking. *Journal of Curriculum Studies, 31*(3), 285-302. https://doi.org/10.1080/002202799183133

Bailin, S., & Siegel, H. (2003). Critical thinking. In Blake, N., Smeyers, P., Smith, R., & Standish, P. (Eds.), *The Blackwell guide to the philosophy of education* (pp. 181-193). Blackwell. https://doi.org/10.1002/9780470996294

Baloche, L., Mauger, M. L., Willis, T. M., Filinuk, J. R., & Michalsky, B. V. (1993). Fishbowls, creative controversy, talking chips: exploring literature cooperatively. *The English Journal, 82*, 43-49. https://doi.org/820164

Barnett, R. (1997). *Higher education: A critical business*. McGraw-Hill Education.

Belenky, M. F., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. (1986). *Women's ways of knowing: The development of self, voice, and mind* (Vol. 15). Basic Books.

Bernstein, B. (2003). *Class, codes and control: Applied studies towards a sociology of language* (Vol. 2). Psychology Press.

Bonk, C. J., & Smith, G. S. (1998). Alternative instructional strategies for creative and critical thinking in the accounting curriculum. *Journal of Accounting Education, 16*(2), 261-293. https://doi.org/10.1016/S0748-5751(98)00012-8

Bowell, T., & Kemp, G. (2005). *Critical thinking: A concise guide*. Routledge.

Burbules, N. C., & Berk, R. (1999). Critical thinking and critical pedagogy: relations, differences, and limits. In T. S. Popkewitz & L. Fendler (Eds.), *Critical theories in education*: *Changing terrains of knowledge and politics* (pp. 45-65). Routledge. https://doi.org/10.4324/9780203826256

Cansoy, R., Parlar, H., & Polatçan, M. (2018). Teacher candidates' critical thinking tendencies research in turkey: a content analysis. *Universal Journal of Educational Research*, *6*(9), 1974-1980. http://dx.doi.org/10.13189/ujer.2018.060916

Casner-Lotto, J., & Barrington, L. (2006). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century US workforce*. Partnership for 21st Century Skills.

Council of Europe. (2018). Reference framework for democratic culture: Vol. 1. Contexts, concepts and model. Council of Europe Publishing. Available online at https://www.coe.int/en/web/campaign-free-to-speak-safe-to-learn/reference-framework-of-competences-for-democratic-culture

Cross, D. R., & Paris, S. G. (1988). Developmental and instructional analyses of children's metacognition and reading comprehension. *Journal of Educational Psychology*, *80*(2), 131. https://psycnet.apa.org/doi/10.1037/0022-0663.80.2.131

Danvers, E. (2018). Who is the critical thinker in higher education? A feminist re-thinking. *Teaching in Higher Education*, *23*(5), 548-562. https://doi.org/10.1080/13562517.2018.1454419

Daud, N. M., & Husin, Z. (2004). Developing critical thinking skills in computer-aided extended reading classes. *British Journal of Educational Technology*, *35*(4), 477-487. https://doi.org/10.1111/j.0007-1013.2004.00405.x

Davies, M. (2011). Introduction to the special issue on critical thinking in higher education. *Higher Education Research & Development*, *30*(3), 255-260. https://doi.org/10.1080/07294360.2011.562145

Davies, M. (2015). A model of critical thinking in higher education. In *Higher education: Handbook of theory and research* (pp. 41-92). Springer. https://doi.org/10.1007/978-3-319-12835-1_2

Davies, M., & Barnett, R. (Eds.). (2015). *The Palgrave handbook of critical thinking in higher education*. Springer. https://doi.org/10.1057/9781137378057

Dellantonio, S., & Pastore, L. (2021). Ignorance, misconceptions and critical thinking. *Synthese*, *198*(8), 7473-7501. https://doi.org/10.1007/s11229-019-02529-7

Dennick, R. G., & Exley, K. (1998). Teaching and learning in groups and teams. *Biochemical Education*, *26*(2), 111-115. https://doi.org/10.1016/S0307-4412(98)00028-4

Dixon-Woods, M. (2011). Systematic reviews and qualitative methods. In D. Silverman (ed.), *Qualitative research* (pp. 331-346). Sage.

Dixon-Woods, M., Agarwal, S., Jones, D., Young, B., & Sutton, A. (2005). Synthesising qualitative and quantitative evidence: A review of possible methods. *Journal of Health Services Research & Policy*, *10*(1), 45-53. https://doi.org/10.1177/135581960501000110

Doğanay, A., Taş, M. A., & Erden, Ş. (2007). Üniversite öğrencilerinin bir güncel tartışmalı konu bağlamında eleştirel düşünme becerilerinin değerlendirilmesi [Assessing university students' critical thinking skills in the context of a current controversial issue]. *Educational Administration: Theory and Practice, 52*(52), 511-546.

Doğanay, A., & Yağcı, R. (2011). İlköğretim beşinci sinif sosyal bilgiler öğretiminde öğretmenlerin eleştirel düşünme becerilerini geliştirmek için uyguladiklari etkinliklerin değerlendirilmesi [Evaluating activities which are performed by teachers in teaching social studies to the fifth grade students to improve their criticial thinking skills]. *Education Sciences*, *6*(2), 1679-1702.

Dumitru, D., Bigu, D., Elen, J., Ahern, A., McNally, C., & O'Sullivan, J. J. (2018). *A European review on critical thinking educational practices in higher education institutions.* Available online at https://researchrepository.ucd.ie/bitstream/10197/9865/1/CRITHINKEDU_O2_%28ebook%29.pdf

Elder, L., & Paul, R. (2021). *Critical thinking: Tools for taking charge of your learning and your life* (4th ed.). Foundation for Critical Thinking.

Ennis, R. H. (1964). A definition of critical thinking. *The Reading Teacher*, *17*(8), 599-612.

Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational Leadership, 43*(2), 44-48.

Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher*, *18*(3), 4-10. https://doi.org/10.3102%2F0013189X018003004

Ennis, R. H. (1991). Critical thinking: A streamlined conception. *Teaching Philosophy*, *14*(1), 5-25. https://doi.org/10.5840/teachphil19911412

Ennis, R. H. (2011). Critical thinking: Reflection and perspective Part II. *Inquiry: Critical Thinking Across the Disciplines*, *26*(2), 5-19. https://doi.org/10.5840/inquiryctnews201126215

Ennis, R. H. (2013). Critical Thinking across the curriculum: The wisdom CTAC program. *Inquiry: Critical Thinking Across the Disciplines, 28*(2), 25-52. https://doi.org/10.5840/inquiryct20132828

Ennis, R. H. (2015). Critical thinking: A streamlined conception. In *The Palgrave handbook of critical thinking in higher education* (pp. 31-47). Palgrave Macmillan. https://doi.org/10.10 7/9781137378057

European Commission. (2013). *Supporting teacher competence development for better learning outcomes*. Publications Office of the European Union. Available online at http://ec.europa.eu/education/policy/school/doc/teachercomp_en.pdf

Evans, R. W. (2010). The (unfulfilled) promise of critical pedagogy. In Totten, S. & Pedersen, J.E. (Eds.), *Teaching and studying social issues: Major programs and approaches* (pp. 233-249). Information Age Publishing.

Facione, P. A. (1990). *Critical thinking: a statement of expert consensus for purposes of educational assessment and ınstruction. Research findings and recommendations.*

The Delphi Report. Available online at https://files.eric.ed.gov/fulltext/ED315423.pdf

Facione, P. A. (2000). The disposition toward critical thinking: Its character, measurement, and relation to critical thinking skill. *Informal Logic*, *20*(1), 61-84. https://doi.org/10.22329/il.v20i1.2254

Facione, P. A. (2020). *Critical thinking: What it is and why it counts*. Insight Assessment. Available online at https://www.insightassessment.com/wp-content/uploads/ia/pdf/whatwhy.pdf

Facione, P. A., Facione, N. C., & Giancarlo (Sanchez), C. A. (1994). Critical thinking disposition as a measure of competent clinical judgment: the development of the California critical thinking disposition inventory. *Journal of Nursing Education, 33*(8), 345-50. https://doi.org/10.3928/0148-4834-19941001-05

Facione, P. A., Giancarlo (Sanchez), C., Facione, N., & Gainen (Kurfiss), J. (1995). The disposition toward critical thinking. *Journal of General Education, 44*(1), 1-25.

Farber, K. S. (1991). Feminist criticism and the reconceptualization of critical thinking. *Journal of Thought*, 26(3/4), 74-81.

Fernandez-Balboa, J. M. (1993). Critical pedagogy: Making critical thinking really critical. *Analytic Teaching*, *13*(2), 61-72.

Fisher, A., & Scriven, M. (1997). *Critical thinking: Its definition and assessment*. EdgePress.

Freire, P. (2018). *Pedagogy of the oppressed* (M. Bergman-Ramos Trans.). Bloomsbury Academic.

Gellin, A. (2003). *The effect of undergraduate student involvement on critical thinking: A meta-analysis of the literature from 1991-2000* (Publication No. 3089146) [Doctoral dissertation, State University of New York at Buffalo]. ProQuest Dissertations Publishing.

Giroux, H. A. (1985). Critical pedagogy, cultural politics, and the discourse of experience. *Journal of Education*, *167*(2), 22-41.

Giroux, H. A. (1988). *Teachers as intellectuals: Toward a critical pedagogy of learning.* Bergin & Garvey.

Giroux, H. A. (2010). Teachers as transformative intellectuals. In Canestrari, A. S. & Marlowe, B. A., *Educational foundations: An anthology of critical readings* (2nd ed., pp. 183-189). Routledge.

Gök, B., & Erdoğan, T. (2011). Sınıf öğretmeni adaylarının yaratıcı düşünme düzeyleri ve eleştirel düşünme eğilimlerinin incelenmesi [The investigation of the creative thinking levels and the critical thinking disposition of pre-service elementary teachers]. *Journal of Faculty of Educational Sciences*, *44*(2), 29-52. https://doi.org/10.1501/Egifak_0000001223

Halpern, D. F. (1997). *Critical thinking across the curriculum: A brief edition of thought & knowledge*. Routledge. https://doi.org/10.4324/9781315805719

Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist, 53*(4), 449-455. https://doi.org/10.1037/0003-066X.53.4.449

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. *New Directions for Teaching and Learning*, *80*, 69-74. https://doi.org/10.1002/tl.8005

Halpern, D. F. (2001). Assessing the effectiveness of critical thinking instruction. *The Journal of General Education*, *50*(4), 270-286.

Halpern, D. F., & Butler, H. A. (2019). Teaching critical thinking as if our future depends on it, because it does. In Dunlosky, J. & Rawson, K.A. (Eds.), *The Cambridge handbook of cognition and education* (pp. 51-66). Cambridge University Press. https://doi.org/10.1017/9781108235631.004

Harden, A., & Thomas, J. (2005). Methodological issues in combining diverse study types in systematic reviews. *International Journal of Social Research Methodology*, *8*(3), 257-271. https://doi.org/10.1080/13645570500155078

Harrell, M. (2011). Argument diagramming and critical thinking in introductory philosophy. *Higher Education Research & Development*, *30*(3), 371-385. https://doi.org/10.1080/07294360.2010.502559

Harrell, M., & Wetzel, D. (2015). Using argument diagramming to teach critical thinking in a first-year writing course. In *The Palgrave handbook of critical thinking in higher education* (pp. 213-232). Palgrave Macmillan. https://doi.org/10.1057/9781137378057_14

Heard, J., Scoular, C., Duckworth, D., Ramalingam, D., & Teo, I. (2020). Critical thinking: Skill development framework. Available online at https://research.acer.edu.au/cgi/viewcontent.cgi?article=1042&context=ar_misc

Heath, S. B. (1983). *Ways with words: Language, life and work in communities and classrooms.* Cambridge University Press.

Hennessey, M. G. (1999). *Probing the dimensions of metacognition: Implications for conceptual change teaching-learning*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA. Available online at https://files.eric.ed.gov/fulltext/ED446921.pdf

Hitchcock, D. (2015). The effectiveness of instruction in critical thinking. In Davies, M. & Barnett, R. (Eds.), *The Palgrave handbook of critical thinking in higher education* (pp. 283-294). Palgrave MacMillan. https://doi.org/10.1057/9781137378057_18

İşlek, D., & Hürsen, Ç. (2014). Evaluation of critical thinking studies in terms of content analysis. *Procedia-Social and Behavioral Sciences*, *131*, 290-299. https://doi.org/10.1016/j.sbspro.2014.04.119

Jones, A. (2015). A disciplined approach to critical thinking. In Davies, M. & Barnett, R. (Eds.), *The Palgrave handbook of critical thinking in higher education* (pp. 169-182). Palgrave Macmillan. https://doi.org/10.1057/9781137378057_11

Kaplan, L. D. (1991). Teaching intellectual autonomy: The failure of the critical thinking movement. *Educational Theory*, *41*(4), 361-370. https://doi.org/10.1111/j.1741-5446.1991.00361.x

Keser, F., Akar, H., & Yildirim, A. (2011). The role of extracurricular activities in active citizenship education. *Journal of Curriculum Studies*, *43*(6), 809-837. https://doi.org/10.1080/00220272.2011.591433

Kirk, D. (1986). Beyond the limits of theoretical discourse in teacher education: Towards a critical pedagogy. *Teaching and Teacher Education*, *2*(2), 155-167. https://doi.org/10.1016/0742-051X(86)90014-4

Kitchenham, B., & Charters, S. M. (2007). *Guidelines for performing systematic literature reviews in software engineering* (EBSE Technical Report EBSE-2007-01). Available online at https://www.researchgate.net/publication/302924724_Guidelines_for_performing_Systematic_Literature_Reviews_in_Software_Engineering

Kong, S. L. (2001). *Critical thinking dispositions of pre-service teachers in Singapore: A preliminary investigation*. Paper presented at the AARE Conference, Fremantle, Australia. Available online at https://repository.nie.edu.sg/bitstream/10497/11504/1/AARE-2001-KongSL.pdf

Kuhn, D. (1986). Education for thinking. *Teachers College Record*, *87*(4), 495-512. https://doi.org/10.1177%2F016146818608700404

Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher, 28*(2), 16-46. https://doi.org/10.3102%2F0013189X028002016

Kuhn, D., & Dean, D. (2004). Metacognition: A bridge between cognitive psychology and educational practice. *Theory into Practice*, *43*(4), 268-273. https://doi.org/10.1207/s15430421tip4304_4

Lai, E. R. (2011). Critical thinking: A literature review. *Pearson's Research Reports*, *6*(1), 40-41.

Lee, V. E., & Burkam, D. T. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. Economic Policy Institute.

Lewis, A., & Smith, D. (1993). Defining higher-order thinking. *Theory into Practice*, *32*(3), 131-137. https://doi.org/10.1080/00405849309543588

Lipman, M. (1988). Critical thinking—What can it be? *Educational Leadership, 46*(1), 38-43.

Liu, O. L., Frankel, L., & Roohr, K. C. (2014). Assessing critical thinking in higher education: Current state and directions for next-generation assessment. *ETS Research Report Series*, *2014*(1), 1-23. https://doi.org/10.1002/ets2.12009

McLaren, P., & Hammer, R. (1989). Critical pedagogy and the postmodern challenge: Toward a critical postmodernist pedagogy of liberation. *Educational Foundations*, *3*(3), 29-62.

McPeck, J. E. (1990). Critical thinking and subject specificity: A reply to Ennis. *Educational Researcher, 19*(4), 10-12. https://doi.org/10.3102%2F0013189X019004010

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis. A methods sourcebook* (3rd ed.). Sage.

Ministry of National Education. (1973). *Law of national education.* Available online at https://www.mevzuat.gov.tr/MevzuatMetin/1.5.1739.pdf

Moore, T. J. (2011). Critical thinking and disciplinary thinking: A continuing debate. *Higher Education Research & Development*, *30*(3), 261-274. https://doi.org/10.1080/07294360.2010.501328

Moore, T. J. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education, 38*(4), 506-522. https://doi.org/10.1080/03075079.2011.586995

Moss, P. A., & Koziol, S. M. (1991). Investigating the validity of a locally developed critical thinking test. *Educational Measurement: Issues and Practice, 10*(3), 17-22. https://doi.org/10.1111/j.1745-3992.1991.tb00199.x

Okoli, C., & Schabram, K. (2010). A guide to conducting a systematic literature review of information systems research. *Sprouts: Working Papers on Information Systems, 10*(26), 1-50. https://dx.doi.org/10.2139/ssrn.1954824

Özdemir, S. M. (2005). Üniversite öğrencilerinin eleştirel düşünme becerilerinin çeşitli değişkenler açısından değerlendirilmesi [Assessing university students' critical thinking skills for some variables]. *The Journal of Turkish Educational Sciences, 3*(3), 297-316.

Paul, R. W. (1981). Teaching critical thinking in the strong sense. *Informal Logic, 4*(2), 2-7. https://doi.org/10.22329/il.v4i2.2766

Paul, R. W. (1992). Critical thinking: What, why, and how? *New Directions for Community Colleges*, 77, 3-24. https://doi.org/10.1002/cc.36819927703

Paul, R. W. (2011). Reflections on the nature of critical thinking, its history, politics, and barriers and on its status across the college/university curriculum part I. *INQUIRY: Critical Thinking Across the Disciplines, 26*(3), 5-24.

Paul, R. W. (2018). Critical thinking and the critical person. In *Thinking: The second international conference* (pp. 373-403). Routledge.

Paul, R. W., & Binker, A. J. A. (1990). *Critical thinking: What every person needs to survive in a rapidly changing world*. Center for Critical Thinking and Moral Critique.

Paul, R. W., & Elder, L. (2006). Critical thinking: The nature of critical and creative thought. *Journal of Developmental Education, 30*(2), 34-35.

Paul, R. W., Elder, L., & Bartell, T. (1997). *California teacher preparation for instruction in critical thinking: Research findings and policy recommendations*. Foundation for Critical Thinking. Available online at https://files.eric.ed.gov/fulltext/ED437379.pdf

Peters, M. D. J., Godfrey, C. M. R. N., Khalil, H. B. M., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare, 13*(3), 141-146. https://doi.org/10.1097/XEB.0000000000000050

Pithers, R. T., & Soden, R. (2000). Critical thinking in education: a review. *Educational Research. 42*(3), 237-249. https://doi.org/10.1080/001318800440579

Ricketts, J. C., & Rudd, R. D. (2005). Critical thinking skills of selected youth leaders: The efficacy of critical thinking dispositions, leadership, and academic performance. *Journal of Agricultural Education, 46*(1), 32-43. https://doi.org/10.5032/jae.2005.01032

Roohr, K., Olivera-Aguilar, M., Ling, G., & Rikoon, S. (2019). A multi-level modeling approach to investigating students' critical thinking at higher education institutions.

Assessment & Evaluation in Higher Education, 44(6), 946-960. https://doi.org/10.1080/02602938.2018.1556776

Scriven, M., & Paul, R. (1987). *Defining critical thinking*. The 8th Annual International Conference on Critical Thinking and Education Reform, Summer. Available online at http://www.criticalthinking.org/pages/defining-critical-thinking/766

Seferoğlu, S. S., & Akbıyık, C. (2006). Eleştirel düşünme ve öğretimi [Teaching critical thinking]. *Hacettepe University Journal of Education, 30*(30), 193-200.

Semerci, N. (2000). Kritik düşünme ölçeği [Critical thinking scale]. *Education and Science*, *25*(116), 23-26.

Severiens, S., & ten Dam, G. (1998). Gender and learning: comparing two theories. *Higher Education, 35*, 329-350. https://doi.org/10.1023/A:1003033003124

Sibbett, L. A. (2016). Toward a transformative criticality for democratic citizenship education. *Democracy and Education*, *24*(2), Article 1.

Siegel, H. (1999). What (good) are thinking dispositions? *Educational Theory*, *49*(2), 207-221. http://dx.doi.org/10.1111/j.1741-5446.1999.00207.x

Sternberg, R. J. (1986). *Critical thinking: Its nature, measurement, and improvement* National Institute of Education. Available online at http://eric.ed.gov/PDFS/ED272882.pdf

Sternberg, R. J. (1987). Teaching critical thinking: eight ways to fail before you begin. *Phi Delta Kappan*, *68*(6), 456-459.

ten Dam, G., & Volman, M. (2004). Critical thinking as a citizenship competence: Teaching strategies. *Learning and Instruction, 14*(4), 359-379. https://doi.org/10.1016/j.learninstruc.2004.01.005

Thayer-Bacon, B. J. (2000). *Transforming critical thinking: Thinking constructively*. Teachers College Press.

Toulmin, S. E. (2003). *The uses of argument* (3rd ed.). Cambridge University Press.

Twale, D., & Sanders, C. S. (1999). Impact of non-classroom experiences on critical thinking ability. *Naspa Journal*, *36*(2), 133-146. https://doi.org/10.2202/1949-6605.1078

Üredi, L., & Kösece, P. (2020). Investigating the relationship between critical thinking skills and mathematical problem solving achievements of secondary education students. *European Journal of Educational Sciences, 7*(2), 186-202. http://dx.doi.org/10.19044/ejes.v7no2a11

Wheary, J., & Ennis, R. H. (1995). Gender bias in critical thinking: Continuing the dialogue. *Educational Theory*, *45*(2), 213-224. https://doi.org/10.1111/j.1741-5446.1995.00213.x

Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? *Arts Education Policy Review, 109*(4), 21-32. https://doi.org/10.3200/AEPR.109.4.21-32

Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, *39*(1), 93-112. https://doi.org/10.1177%2F0739456X17723971

Yildirim, A. (2013). Teacher education research in Turkey: Trends, issues and priority areas. *Education and Science*, *38*(169), 175-191.

Appendix

List of the Reviewed Studies

[1]Açışlı, S. (2015). Investigation of teacher candidates' learning styles and critical thinking dispositions. *Necatibey Faculty of Education Electronic Journal of Science & Mathematics Education, 9*(1), 23-48.

[2]Açışlı, S. (2016). Investigation of class teacher candidates' learning styles and critical thinking dispositions. *Elementary Education Online, 15*(1), 273-285.

[3]Akar, C. (2017). The predictive level of preservice classroom teachers' multicultural values of critical thinking disposition. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD), 18*(1), 741-762.

[4]Akçalı, A. (2019). An action research for developing critical thinking skills of history teacher candidates. *Kastamonu Education Journal, 27*(1), 231-246.

[5]Akgün, A., & Duruk, U. (2016). The investigation of preservice science teachers' critical thinking dispositions in the context of personal and social factors. *Science Education International, 27*(1), 3-15.

[6]Akyüz, H. İ., Samsa-Yetik, S., & Keser, H. (2015). Effects of metacognitive guidance on critical thinking disposition. *Pegem Eğitim ve Öğretim Dergisi, 5*(2), 133-148.

[7]Alkın-Şahin, S., Tunca, N., & Ulubey, Ö. (2014). The relationship between pre-service teachers' educational beliefs and their critical thinking tendencies. *Elementary Education Online, 13*(4), 1473-1492.

[8]Alper, A. (2010). Critical thinking disposition of pre-service teachers. *Education and Science, 35*(158), 14-27.

[9]Arsal, Z. (2015). The effects of microteaching on the critical thinking dispositions of pre-service teachers. *Australian Journal of Teacher Education (Online), 40*(3), 140-153.

[10]Arslangilay, A. S. (2019). 21st century skills of CEIT teacher candidates and the prominence of these skills in the CEIT undergraduate curriculum. *Educational Policy Analysis and Strategic Research, 14*(3), 330-346.

[11]Aşkın Tekkol, İ., & Bozdemir, H. (2018). An investigation of reflective thinking tendencies and critical thinking skills of teacher candidates. *Kastamonu Education Journal 26*(6), 1897-1907.

[12]Aybek, B., & Aslan, S. (2017). An investigation of educational philosophies adopted and critical thinking disposition in terms of various variables. *Gaziantep University Journal of Social Sciences, 16*(2), 373-385.

[13]Aybek, B. (2018). An examination of the relationship between the critical thinking dispositions of prospective teachers and their attitudes toward multicultural education. *Journal of Higher Education (Turkey), 8*(3), 282-292.

[14]Aybek, B. (2007). Konu ve beceri temelli eleştirel düşünme öğretiminin öğretmen adaylarının eleştirel düşünme eğilimi ve düzeyine etkisi [The effect of content-based and skill-based critical thinking teaching on prospective teachers' critical thinking dispositions and level]. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 16*(2), 43-60.

[15]Bağcı, H., & Şahbaz, N. (2012). Türkçe öğretmeni adaylarının eleştirel düşünme becerileri üzerine bir değerlendirme [An analysis of the Turkish teacher candidates' critical thinking skills]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *8*(1), 1-12.

[16]Barin, M. (2019). Pre-service teachers' attitudes towards English courses and their critical thinking skills. *World Journal of Education*, *9*(2), 46-55.

[17]Bayram, D., Kurt, G., & Atay, D. (2019). The implementation of WebQuest-supported critical thinking instruction in pre-service English teacher education: the Turkish context. *Participatory Educational Research*, *6*(2), 144-157.

[18]Beşoluk, Ş., & Önder, İ. (2010). Investigation of teacher candidates' learning approaches, learning styles and critical thinking dispositions. *Elementary Education Online, 9*(2), 679-693.

[19]Bulgurcuoglu, A. N. (2016). Relationship between critical thinking levels and attitudes towards reading habits among pre-service physical education teachers. *Educational Research and Reviews*, *11*(8), 708-712.

[20]Bulut, R., & Ocak, G. (2017). Eleştirel düşünme eğilimi ile öğrenme stratejileri arasındaki ilişkinin incelenmesi [An investigation of the relationship between critical thinking disposition and learning strategies]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 18*(3), 1010-1031.

[21]Çakmak Güleç, H. (2010). Evaluation of prospective primary and pre-school teachers' critical thinking level. *Education and Science*, *35*(157), 3-14.

[22]Çekin, A. (2013). Din kültürü ve ahlak bilgisi öğretmen adaylarının eleştirel düşünme becerilerinin bazı değişkenler açısından incelenmesi [The examination of critical thinking skills of religious culture and ethics teacher candidates ın terms of some variables]. *Amasya Üniversitesi İlahiyat Fakültesi Dergisi, 1*, 25-46.

[23]Çelik, Ö., Çokçaliskan, H., & Yorulmaz, A. (2018). Investigation of the effect of pre-service classroom teachers' critical thinking disposition on their media literacy. *International Journal of Evaluation and Research in Education*, *7*(3), 194-202.

[24]Certel, Z., Çatıkkaş, F., & Yalçınkaya, M. (2011). Beden eğitimi öğretmen adaylarının duygusal zekâ ile eleştirel düşünme eğilimlerinin incelenmesi [Analysis of the emotional ıntelligence levels and critical thinking dispositions of physical education teacher candidates]. *Selçuk Üniversitesi Beden Eğitimi Ve Spor Bilim Dergisi*, *13*(1), 74-81.

[25]Çetinkaya, Z. (2011). Türkçe öğretmen adaylarinin eleştirel düşünmeye ilişkin görüşlerinin belirlenmesi [Determination of Turkish education teacher candidates' views related to critical thinking]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 12*(3), 93-108.

[26]Çinici, A., & Ergin, B. (2019). The effects of discussion and decision-making based activities concerning GMOs on critical thinking dispositions of teacher candidates. *Necatibey Faculty of Education Electronic Journal of Science & Mathematics Education*, *13*(2), 735-758.

[27]Coşkun, M. (2013). Din kültürü ve ahlak bilgisi öğretmen adaylarının eleştirel düşünme eğilimleri (ilahiyat-eğitim dkab karşılaştırması [Critical thinking level and dispositions of pre-service teachers of religious culture and ethics

knowledge]. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *17*(1), 143-162.

[28]Demir, S. (2015). Evaluation of critical thinking and reflective thinking skills among science teacher candidates. *Journal of Education and Practice*, *6*(18), 17-21.

[29]Demir, S. (2015). Perspectives of science teacher candidates regarding scientific creativity and critical thinking. *Journal of Education and Practice*, *6*(17), 157-159.

[30]Demirbag, B., Unisen, A., & Yesilyurt, A. (2016). Training of critical thinking skills in teacher candidates and placebo effect: A quasi-experimental study. *Eurasian Journal of Educational Research*, *63*, 375-392.

[31]Deringöl, Y. (2017). Öğretmen adaylarının eleştirel düşünme standartlarının belirlenmesi [Determining critical thinking standards of teacher candidates]. *Igdir University Journal of Social Sciences*, *13*, 44-65.

[32]Dinçer, B., Yavuz, A., & Eren, S. (2019). Rehberlik ve psikolojik danışmanlık bölümü öğrencilerinin sosyal değer algıları ve eleştirel düşünme standartları arasındaki ilişkinin incelenmesi [investigation of the relationship between the social values perception and critical thinking standards from the guidance and psychological counseling department students]. *Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi*, *8*(4), 2300-2321.

[33]Durukan, E., & Maden, S. (2010). Türkçe öğretmeni adaylarının eleştirel düşünme eğilimleri üzerine bir araştırma [A study on the evaluation of Turkish pre-service teachers' critical thinking tendency]. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, *1*(28), 25-33.

[34]Ekinci, Ö., & Aybek, B. (2010). Analysis of the empathy and the critical thinking disposition of the teacher candidates. *Elementary Education Online*, *9*(2), 816-827.

[35]Erdoğan, F. (2020). The relationship between prospective middle school mathematics teachers' critical thinking skills and reflective thinking skills. *Participatory Educational Research*, *7*(1), 220-241.

[36]Erdoğan, İ. (2015). Din kültürü ve ahlak bilgisi öğretmen adaylarının eleştirel düşünme eğilim düzeylerinin incelenmesi [The examining of critical thinking dispositions of religious culture and ethics teacher candidates]. *Marife Dini Araştırmalar Dergisi*, *15*(2), 321-342.

[37]Erişti, B., & Erdem, C. (2018). Öğretmen adaylarinin medya okuryazarliği beceri düzeyleri ile eleştirel düşünme eğilimleri arasindaki ilişki [The relationship between prospective teachers' levels of media literacy skills and critical thinking dispositions]. *Elektronik Sosyal Bilimler Dergisi*, *17*(67), 1234-1251.

[38]Fettahlıoğlu, P., & Kaleci, D. (2018). Online argumentation implementation in the development of critical thinking disposition. *Journal of Education and Training Studies*, *6*(3), 127-136.

[39]Geçit, Y., & Akarsu, A. H. (2017). Critical thinking tendencies of geography teacher candidates in Turkey. *Universal Journal of Educational Research*, *5*(8), 1362-1371.

[40]Genç, G. (2017). The relationship between academic achievement, reading habits and critical thinking dispositions of Turkish tertiary level EFL learners. *Educational Research Quarterly*, *41*(2), 43-73.

[41]Gökkuş, İ., & Delican, B. (2016). Sınıf öğretmeni adaylarının eleştirel düşünme eğilimleri ve okuma alışkanlığına ilişkin tutumları [Critical thinking tendencies and attitudes toward reading habits of pre-service classroom teachers]. *Cumhuriyet Uluslararası Eğitim Dergisi*, *5*(1), 10-28.

[42]Gül, M. D., & Akçay, H. (2020). Structuring a new socioscientific issues (SSI) based instruction model: impacts on pre-service science teachers' (PSTs) critical thinking skills and dispositions. *International Journal of Research in Education and Science*, *6*(1), 141-159.

[43]Hayırsever, F., & Oğuz, E. (2017). Öğretmen adaylarının eğitim inançlarının eleştirel düşünme eğilimlerine etkisi [Effects of teacher candidates' educational beliefs on their critical thinking tendencies]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *17*(2), 757-778.

[44]Ekici, D. İ. (2017). The effects of online communities of practice on pre-service teachers' critical thinking dispositions. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 3801-3827.

[45]Kandemir, M. A. (2017). Sınıf ve ilköğretim matematik öğretmen adaylarının eleştirel düşünme eğilim düzeylerinin bazı değişkenlere göre incelenmesi [Investigation of critical thinking tendency levels of classroom and elementary mathematics teacher candidates in terms of some variables]. *International Periodical for the Languages, Literature and History of Turkish or Turkic*, *12*(6), 453-474.

[46]Karademir, Ç. A., & Saracaloğlu, A. S. (2017). Öğretmen adaylarinin sorgulama ve eleştirel düşünme becerilerinin öğretmen öz yeterlik düzeyine etkisi [The effect of pre-service teachers' inquiry and critical thinking skills on teacher self-efficacy]. *International Periodical for the Languages, Literature and History of Turkish or Turkic, 12*(33), 261-290.

[47]Karagöl, İ., & Bekmezci, S. (2015). Investigating academic achievements and critical thinking dispositions of teacher candidates. *Journal of Education and Training Studies*, *3*(4), 86-92.

[48]Karaoğlan-Yilmaz, F. G., Yilmaz, R., Üstün, A. B., & Keser, H. (2019). Examination of critical thinking standards and academic self-efficacy of teacher candidates as a predictor of metacognitive thinking skills through structural equation modelling. *Journal of Theoretical Educational Science*, *12*(4), 1239-1256.

[49]Karaoğlan-Yılmaz, F. G., & Yılmaz, R. (2020). The impact of feedback form on transactional distance and critical thinking skills in online discussions. *Innovations in Education and Teaching International*, *57*(1), 119-130.

[50] Karasakaloğlu, N., Saracaloğlu, S., & Özelçi, S. (2012). Türkçe öğretmeni adaylarinin okuma stratejileri, eleştirel düşünme tutumlari ve üst bilişsel yeterlilikleri [Turkish prospective teachers' reading strategies, critical thinking attitudes and metacognitive competencies]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *13*(1), 207-221.

[51]Kartal, T. (2012). İlköğretim fen bilgisi öğretmen adaylarinin eleştirel düşünme eğilimlerinin incelenmesi [Exploring of dispositions toward critical thinking in pre-service elementary science teachers]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *13*(2), 279-297.

[52]Kesicioglu, O. S., & Deniz, U. (2014). Investigation of pre-school children's perception of teacher in their drawings. *Online Submission*, *5*, 606-613.

[53]Kilic, I., Yazici, T., & Topalak, S. I. (2017). Critical thinking disposition of music teachers. *Eurasian Journal of Educational Research*, *17*(72), 185-202.

[54]Kizilet, A. (2017). Investigation of critical thinking attitudes and reading habits of teacher candidates. *Educational Research and Reviews*, *12*(6), 323-328.

[55]Koçak Macun, B., Kurtlu, Y., Ulaş, A. H., & Epçaçan, C. (2015). Sınıf öğretmeni adaylarinin eleştirel düşünme düzeyleri ve okumaya yönelik tutumlari arasindaki ilişki [Examining of the elementary class teachers' critical thinking levels and their attitudes towards reading]. *Ekev Akademi Dergisi*, *61*, 211-228.

[56]Kozikoglu, İ. (2019). Investigating critical thinking in prospective teachers: metacognitive skills, problem solving skills and academic self-efficacy. *Journal of Social Studies Education Research*, *10*(2), 111-130.

[57]Küçükoğlu, A., & Koçyiğit, S. (2015). The effectiveness of community service-learning in teacher training. *Eğitimde Kuram ve Uygulama*, *11*(2), 610-629.

[58]Kutluca, A. Y., Yılmaz, A., & İbiş, E. (2018). Öğretmen adaylarının eleştirel düşünme tutumlarının çeşitli değişkenler açısından incelenmesi [Examination of teacher candidates' critical thinking attitudes in terms of various variables]. *Kastamonu Eğitim Dergisi*, *26*(6), 2045-2055.

[59]Mete-Erdem, D. (2020). Fostering critical thinking skills in ELT through video-based reflection. *Journal of Language and Linguistic Studies*, *16*(1), 104-125.

[60]Nalcaci, A. (2012). The relationship between the individual values and critical thinking skills of prospective social sciences teachers. *International Journal of Progressive Education*, *8*(1), 22-34.

[61]Namlı Altıntaş, İ., & Karaaslan, H. (2019). Peer assessment and active learning experiences of social studies teacher candidates. *Review of International Geographical Education Online*, *9*(2), 319-345.

[62]Ocak, G., Eğmir, E., & Ocak, İ. (2016). Öğretmen adaylarının eleştirel düşünme eğilimlerinin çeşitli değişkenler açısından incelenmesi [Investigation of pre service teachers' critical thinking tendencies in terms of different variables]. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *18*(1), 63-91.

[63]Oguz, A., & Sariçam, H. (2016). The relationship between critical thinking disposition and locus of control in pre-service teachers. *Journal of Education and Training Studies*, *4*(2), 182-192.

[64]Kutlu, M. O., & Schreglmann, S. (2011). Konu temelli eleştirel düşünme öğretiminin öğretmen adaylarinin eleştirel düşünme becerileri üzerine etkisi [The effect of content-based critical thinking program on critical thinking skills]. *Journal of the Cukurova University Institute of Social Sciences*, *20*(1), 165-176.

[65]Özdemir, Y., Buyruk, H., & Güngör, S. (2018). Öğretmen adaylarının eleştirel düşünme eğilimi ile liderlik yönelimleri arasındaki ilişki [The relationship between teacher candidates' critical thinking tendency and leadership orientations]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *14*(2), 548-571.

[66]Özelçi, S. Y., & Çaliskan, G. (2019). What is critical thinking? A longitudinal study with teacher candidates. *International Journal of Evaluation and Research in Education, 8*(3), 495-509.

[67]Özen Uyar, R., Yılmaz Genç, M. M., & Yaşar, M. (2018). Prospective preschool teachers' academic achievements depending on their goal orientations, critical thinking dispositions and self-regulation skills. *European Journal of Educational Research, 7*(3), 601-613.

[68]Özgür, H. (2013). Bilişim teknolojileri öğretmen adaylarının eleştirel düşünme eğilimleri ile bireysel yenilikçilik özellikleri arasındaki ilişkinin çeşitli değişkenler açısından incelenmesi [Exploring of the relationship between critical thinking dispositions and individual innovativeness of information technologies pre-service teachers in terms of various variables]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi, 9*(2), 409-420.

[69]Piji Küçük, D., & Uzun, Y. B. (2013). Müzik öğretmeni adaylarinin eleştirel düşünme eğilimleri [Critical thinking tendencies of music teacher candidates]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 14*(1), 327-345.

[70]Saka, M. (2016). Öğretmen adaylarının çevre etiği yaklaşımlarının yordayıcısı olarak eleştirel düşünme eğilimlerinin incelenmesi [A study of pre service teacher' critical thinking dispositions as predictors of environmental ethics approaches]. *Sakarya University Journal of Education, 6*(3), 100-115.

[71]Samanci, N. K. (2015). A study on the link between moral judgment competences and critical thinking skills. *International Journal of Environmental and Science Education, 10*(2), 135-143.

[72]Semerci, Ç., & Elaldı, Ş. (2014). The roles of metacognitive beliefs in developing critical thinking skills. *Bartın University Journal of Faculty of Education, 3*(2), 317-333.

[73]Sendag, S., Erol, O., Sezgin, S., & Dulkadir, N. (2015). Preservice teachers' critical thinking dispositions and web 2.0 competencies. *Contemporary Educational Technology, 6*(3), 172-187.

[74]Serin, O. (2013). The critical thinking skills of teacher candidates: Turkish republic of Northern Cyprus sampling. *Eurasian Journal of Educational Research, 53,* 231-248.

[75]Tok, E., & Sevinç, M. (2010). Düşünme becerileri eğitiminin eleştirel düşünme ve problem çözme becerilerine etkisi [The effects of thinking skills education on the critical thinking and problem solving skills of preschool teacher candidates]. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 27*(27), 67-82.

[76]Topoğlu, O., & Ünal Öney, E. (2013). Eğitim fakültesi güzel sanatlar eğitimi bölümü öğrencilerinin eleştirel düşünme eğilimlerinin çeşitli değişkenlerle ilişkisinin incelenmesi [Investigation of the relationship between critical thinking dispositions and miscellaneous variables of the students of the faculty of education the department of fine arts education]. *Electronic Turkish Studies, 8*(8), 1301-1312.

[77]Tosuncuoglu, I. (2018). English language and literature students' perceptions of critical thinking. *International Journal of Higher Education, 7*(5), 20-28.

[78]Tümkaya, S. (2011). Fen bilimleri öğrencilerinin eleştirel düşünme eğilimleri ve öğrenme stillerinin incelenmesi [Comparison of college science major students' learning styles and critical thinking disposition]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *12*(3), 215-234.

[79]Turan, H. (2016). Comparison of critical thinking dispositions of prospective teachers. *Educational Research and Reviews*, *11*(8), 867-876.

[80]Ulger, K. (2018). The effect of problem-based learning on the creative thinking and critical thinking disposition of students in visual arts education. *Interdisciplinary Journal of Problem-Based Learning*, *12*(1), Article 10.

[81]Unlu, Z. K., & Dökme, I. (2017). Science teacher candidates' epistemological beliefs and critical thinking disposition. *Eurasian Journal of Educational Research*, *17*(72), 203-220.

[82]Uslu, S. (2020). Critical thinking dispositions of social studies teacher candidates. *Asian Journal of Education and Training*, *6*(1), 72-79.

[83]Uzunöz, F. S., İlker, G. E., Arslan, Y., & Demirhan, G. (2018). The effect of different teaching styles on critical thinking and achievement goals of prospective teachers. *SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi*, *16*(2), 80-95.

[84]Yenice, N. (2012). Öğretmen adaylarinin öz-yeterlik düzeyleri ile problem çözme becerilerinin incelenmesi [Investigating the self-efficacy and problem solving skills of preservice teachers]. *Elektronik Sosyal Bilimler Dergisi*, *11*(39), 36-58.

[85]Yorgancı, S. (2016). Critical thinking dispositions of pre-service mathematics teachers. *Participatory Educational Research*, *3*(3), 36-46.

[86]Yücel Toy, B., & Ok, A. (2012). Incorporating critical thinking in the pedagogical content of a teacher education programme: does it make a difference? *European Journal of Teacher Education*, *35*(1), 39-56.

[87]Yüksel, G., & Alcı, B. (2012). Self-efficacy and critical thinking dispositions as predictors of success in school practicum. *International Online Journal of Educational Sciences*, *4*(1), 81-90.

[88]Ersoy, E., & Başer, N. (2014). İstatistik ve olasılık dersinin senaryo ile öğretim süreci sonunda öğrencilerin eleştirel düşünme eğilimlerindeki değişim [The alteration in students' tendency to critical thinking at the end of the teaching process of "statistics and probability" subject via scenario]. *Ondokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi*, *33*(1), 207-230.